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Risk-Based Capital; Final Rule

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

Office of Federal Housing Enterprise Oversight

12 CFR Part 1750

RIN 2550–AA02

Risk-Based Capital

AGENCY: Office of Federal Housing Enterprise Oversight, HUD.

ACTION: Final rule.

SUMMARY: The Office of Federal Housing Enterprise Oversight (OFHEO) is directed by the Federal Housing Enterprises Financial Safety and Soundness Act of 1992 to issue a risk-based capital regulation for the Federal Home Loan Mortgage Corporation and the Federal National Mortgage Association (collectively, the Enterprises). The regulation specifies the risk-based capital stress test that will be used to determine each Enterprise's risk-based capital requirement and, along with the minimum capital requirement, to determine each Enterprise's capital classification for purposes of possible supervisory action.

EFFECTIVE DATE: September 13, 2001.

FOR FURTHER INFORMATION CONTACT: Edward J. Szymanoski, Acting Associate Director, Office of Risk Analysis and Model Development; Dorothy J. Acosta, Deputy General Counsel; or David A. Felt, Associate General Counsel, Office of Federal Housing Enterprise Oversight, 1700 G Street, NW., Fourth Floor, Washington, DC 20552, telephone (202) 414–3800 (not a toll-free number). The telephone number for the telecommunications device for the deaf is (800) 877–8339.

SUPPLEMENTARY INFORMATION:

I. Introduction

A. Background

The Office of Federal Housing Enterprise Oversight (OFHEO) was established by title XIII of the Housing and Community Development Act of 1992, Pub. L. No. 102–550, known as the Federal Housing Enterprises Financial Safety and Soundness Act of 1992 (1992 Act). OFHEO is an independent office within the U.S. Department of Housing and Urban Development (HUD) with responsibility for examining and regulating the Federal Home Loan Mortgage Corporation (Freddie Mac) and the Federal National Mortgage Association (Fannie Mae) (collectively, the Enterprises) and ensuring that they are adequately capitalized. The 1992 Act expressly directs OFHEO's Director (the Director) to issue a regulation establishing the risk-based capital standard.[1]

Fannie Mae and Freddie Mac are government-sponsored Enterprises that engage in two principal businesses: investing in residential mortgages and guaranteeing securities backed by residential mortgages. The securities the Enterprises guarantee and the debt instruments they issue are not backed by the full faith and credit of the United States and nothing in this document should be construed otherwise.[2] Nevertheless, financial markets treat Enterprise securities more favorably than securities issued by comparable firms. The market prices for Enterprise debt and mortgage-backed securities (MBS) and the fact that the market does not require that those securities be rated by a nationally recognized rating statistical organization suggest that investors perceive that the government implicitly guarantees those securities. Factors contributing to this perception include the Enterprises' public purposes, their Congressional charters, their potential direct access to U.S. Department of Treasury (Treasury) funds, and the statutory exemptions of their debt and MBS from otherwise mandatory investor protection provisions.[3]

B. Statutory Requirements for Risk-Based Capital

The final rule implements the 1992 Act's requirement to establish, by regulation, a risk-based capital ''stress test'' to determine the amount of capital each Enterprise needs to survive a ten-year period characterized by large credit losses and large movements in interest rates (stress period).[4] The 1992 Act also provides that, in order to meet its risk-based capital standard, each Enterprise is required to maintain an additional 30 percent of this amount to protect against management and operations risk.[5] The level of capital[6] required under this standard for an Enterprise will reflect that Enterprise's specific risk profile at the time the stress test is run.

The 1992 Act requires that the stress test subject each Enterprise to large credit losses on the mortgages it owns or guarantees. The rates of default and severity that yield these losses must be reasonably related to the highest rates of default and severity of mortgage losses experienced during a period of at least two consecutive years in contiguous areas of the United States that together contain at least five percent of the total U.S. population (benchmark loss experience).[7] The 1992 Act also prescribes two interest rate scenarios, one with rates falling and the other with rates rising.[8] The risk-based capital amount is based on whichever scenario requires more capital for the Enterprise. In prescribing the two scenarios, the 1992 Act describes the path of the ten-year constant maturity yield (CMT) for each scenario and directs OFHEO to establish the yields on Treasury instruments of other maturities in a manner reasonably related to historical experience and judged reasonable by the Director.

Congress provided OFHEO significant discretion to determine many aspects of the risk-based capital test. This flexibility is evidenced by section 1361(b), which states that ''[i]n establishing the risk-based capital test under subsection (a), the Director shall take into account appropriate distinctions among types of mortgage products, differences in seasoning of mortgages, and any other factors the Director considers appropriate.''[9] The subsection further states that other non-specified characteristics of the stress period, ''such as prepayment experience and dividend policies, will be those determined by the Director, on the basis of available information, to be most consistent with the stress period.''[10] The statute also provides OFHEO flexibility in establishing other aspects of the stress test, including ''the rate of default and severity,''[11] the yields on Treasury securities relative to the ten-year CMT yield,[12] and the definition of ''type of mortgage product.''[13]

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[1] 12 U.S.C. 4513(b)(1).

[2] *See* Federal Home Loan Mortgage Corporation Act, section 306(h)(2) (12 U.S.C. 1455(h)(2)); Federal National Mortgage Association Charter Act, section 304(b) (12 U.S.C. 1719(b)); and 1992 Act, section 1302(4) (12 U.S.C. 4501(4)).

[3] *See, e.g.,* 12 U.S.C. 24 (authorizing unlimited investment by national banks in obligations of or issued by the Enterprises); 12 U.S.C. 1455(g), 1719(d), 1723(c) (exempting securities from oversight from Federal regulators); 15 U.S.C. 77r–1(a) (preempting State law that would treat Enterprise securities differently from obligations of the United States for investment purposes); 15 U.S.C. 77r–1(c) (exempting Enterprise securities from State blue sky laws).

[4] 12 U.S.C. 4611.

[5] 12 U.S.C. 4611(c)(2).

[6] For purposes of the risk-based capital standard, the term ''capital'' means ''total capital'' as defined under section 1303(18) of the 1992 Act (12 U.S.C. 4502(18)).

[7] 12 U.S.C. 4611(a)(1).

[8] 12 U.S.C. 4611(a)(2).

[9] 12 U.S.C. 4611(b)(1).

[10] 12 U.S.C. 4611(b)(2).

[11] 12 U.S.C. 4611(a)(1).

[12] 12 U.S.C. 4611(a)(2).

[13] 12 U.S.C. 4611(d)(2).

The 1992 Act requires that, initially, the stress test not provide for the conduct of new business by the Enterprises during the stress period, except to fulfill contractual commitments to purchase mortgages or issue securities. Four years after the final risk-based capital regulation is issued, OFHEO may modify the stress test to incorporate assumptions about additional new business conducted during the stress period.[14] In doing so, OFHEO is required to take into consideration the results of studies conducted by the Congressional Budget Office and the Comptroller General of the United States on the advisability and appropriate form of new business assumptions. The 1992 Act requires that the studies be completed within the first year after issuance of the final regulation.[15]

C. Rulemaking Chronology

OFHEO has issued a series of **Federal Register** notices soliciting comment on the development of the risk-based capital regulation. The first notice, an Advance Notice of Proposed Rulemaking (ANPR),[16] sought public comment on a number of issues relating to the development of the regulation.[17] OFHEO received 17 comments on the ANPR from a variety of interested parties, including other Federal agencies, Fannie Mae, Freddie Mac, trade associations, and financial organizations. OFHEO considered these comments in the development of two subsequent Notices of Proposed Rulemaking (NPRs), each addressing different components of the risk-based capital regulation. The first Notice of Proposed Rulemaking (NPR1) [18] addressed two issues: (1) The methodology for identifying the benchmark loss experience, and (2) the use of OFHEO's House Price Index (HPI) to update original loan-to-value ratios (LTVs) and to determine house price appreciation paths during the stress period.[19] NPR1 included OFHEO's responses to all of the ANPR comments that related to those two areas.[20] The second Notice of Proposed Rulemaking (NPR2) proposed the remaining specifications of the stress test, including how the HPI would be used and how losses predicted by the stress test would be calibrated to the benchmark loss experience.[21] In addition, OFHEO issued a notice soliciting reply comments to provide interested parties an opportunity to respond to other commenters that addressed NPR2.[22]

OFHEO received comments from 11 commenters on NPR1 and 48 commenters on NPR2. These commenters included Fannie Mae, Freddie Mac, housing and financial trade associations, financial services companies, housing advocacy groups, and other interested parties. Approximately 12 commenters, including the Enterprises, GE Capital Mortgage Corporation, Mortgage Insurance Companies of America, The Consumer Mortgage Coalition, and the Mortgage Bankers Association of America submitted reply comments to NPR2.

The final rule reflects OFHEO's consideration of all of the comments on NPR1 and NPR2, including the reply comments. A summary of the comments by topic and OFHEO's response is set forth below in III., Comments and Responses.

II. Summary of the Stress Test

A. Overview

OFHEO's risk-based capital regulation is part of a larger regulatory framework for the Enterprises that includes a minimum capital requirement and a comprehensive examination program. The purpose of this regulatory framework is to reduce the risk that an Enterprise will fail by ensuring that the Enterprises are capitalized adequately and operating safely, in accordance with the 1992 Act. The 1992 Act requires OFHEO to develop a stress test that simulates the effects of ten years of adverse economic conditions on the existing assets, liabilities, and off-balance-sheet obligations of the Enterprises. OFHEO issued for comment two proposals that implement this requirement.

This summary describes the stress test adopted in the final rule after considering extensive comments from interested parties on the risk-based capital proposals. It includes changes made to the stress test to address the concerns of the commenters where possible and appropriate. These changes are consistent with applicable statutory requirements and with OFHEO's obligation to promote safety and soundness of the housing finance system and to ensure the Enterprises' ability to fulfill their important public missions. These changes are discussed in section III., Comments and Responses. In addition, the final rule includes technical and clarifying changes to the risk-based capital proposals.

The final rule describes a stress test that meets the statutory requirements of the 1992 Act and captures accurately and appropriately the risks of the Enterprises' businesses. The stress test determines, as of a point in time, how much capital each Enterprise would require to survive the economically stressful conditions outlined by the 1992 Act. At a minimum, the stress test will be run quarterly using data on interest rates, housing markets, and an Enterprise's assets, liabilities, off-balance-sheet items, and operations. The stress test is comprised of econometric, financial, and accounting models used to simulate Enterprise financial performance over a ten-year period called the ''stress period.'' The final regulation determines the risk-based capital requirement by computing the amount of starting capital that would permit an Enterprise to maintain a positive capital position throughout the stress period (stress test capital) and adding 30 percent of that amount to cover management and operations risk.

B. Data

OFHEO uses data from the Enterprises and public sources to run the stress test. The stress test utilizes data that characterize, at a point in time, an Enterprise's assets, liabilities, and off-balance sheet obligations, as well as data on economic conditions, such as interest rates and house prices. OFHEO obtains data on economic conditions from public sources. The Enterprises are required to submit data to OFHEO at least quarterly for all on- and off-balance-sheet instruments in a specified format, which is input directly into the computer model. This data submission is called the Risk-Based Capital Report (RBC Report) and serves as the financial ''starting position'' of an Enterprise for the date for which the stress test is run.

[14] 12 U.S.C. 4611(a)(3)(B) and (D).

[15] 12 U.S.C. 4611(a)(3)(C).

[16] Risk-Based Capital, ANPR, 60 FR 7468, February 8, 1995.

[17] The comment period for the ANPR ended on May 9, 1995, and was extended through June 8, 1995. Risk-Based Capital, Extension of Public Comment Period for ANPR, 60 FR 25174, May 11, 1995.

[18] Risk-Based Capital, NPR1, 61 FR 29592, June 11, 1996.

[19] 61 FR 29616, June 11, 1996.

[20] The comment period for NPR1 ended on September 9, 1996, and was extended through October 24, 1996. Risk-Based Capital, Extension of Public Comment Period for NPR1, 61 FR 42824, August 19, 1996.

[21] Risk-Based Capital, Second Notice of Proposed Rulemaking (NPR2), 64 FR 18084, April 13, 1999. The agency extended the comment period twice. The first extension was until November 10, 1999 (64 FR 31756, June 14, 1999), and the second extension was until March 10, 2000 (64 FR 56274, October 19, 1999).

[22] Risk-Based Capital, Solicitation of Reply Comments, 65 FR 13251, March 13, 2000.

As a part of the RBC Report, the Enterprises report aggregated data from groups of loans having similar risk characteristics. The loans within these groups share common values for a set of classification variables. For single family loans, classification variables are original interest rate, current interest rate, original loan-to-value ratio (LTV), mortgage age, Census Division, loan size, status as securitized or unsecuritized, status as government or conventional loan, and product type (e.g. fixed rate, adjustable rate, balloons). Classification variables for multifamily loans are product type, original interest rate, current interest rate, original LTV, debt coverage ratio (DCR);[23] book of business designation,[24] status as securitized or unsecuritized, status as Government or conventional loan, status as interest only or amortizing, and a ratio update flag, which indicates whether LTV and DCR were updated at acquisition. Both single family and multifamily ARM loans are also classified by index, rate reset period, payment reset period, and cap type. These distinctions are associated with different risk characteristics. In this way, over 24 million loans can be aggregated into the minimum number of loan groups that captures important risk characteristics.

Loan groups of new mortgages are also created to simulate the fulfillment of commitments to purchase and/or securitize mortgages that are outstanding at the start of the stress test. The stress test adds new single family mortgages in one of four product types: 30-year fixed-rate, 15-year fixed-rate, one-year CMT adjustable-rate, and 7-year balloon. The percentage of each type added is based on the relative proportions of those types of loans securitized by an Enterprise that were originated during the six months preceding the start of the stress period. The mix of characteristics of these new loans also reflects the characteristics of the loans originated during the preceding six months. All new mortgages are considered to be securitized.

In the down-rate scenario, described below, the stress test specifies delivery of 100 percent of the loans that the Enterprise is obligated to accept under outstanding commitment agreements. These loans are added during the first three months of the stress period. In the up-rate scenario, described below, only 75 percent of these loans are added and deliveries are phased in during the first six months of the stress period. The new loan groups are then treated like the loan groups reported by the Enterprise in the RBC Report.

Because of the smaller number and greater diversity of the Enterprises' nonmortgage financial instruments, the stress test projects these cash flows at the individual instrument level, rather than at a group level. The RBC Report includes the instrument characteristics necessary to model the terms of the instruments, which include both investment and debt securities and derivative contracts.

C. Stress Test Conditions

1. Benchmark Loss Experience

To identify the stressful credit conditions that are the basis for credit losses in the stress test, (benchmark loss experience), OFHEO uses a methodology based on historical analysis of newly originated, 30-year, fixed-rate, first-lien mortgages on owner-occupied, single family properties. Using this methodology, OFHEO identifies the worst cumulative credit losses experienced by loans originated during a period of at least two consecutive years in contiguous states comprising at least five percent of the U.S. population, as required by the 1992 Act. Loans originated in Arkansas, Louisiana, Mississippi and Oklahoma in 1983 and 1984 currently serve as the benchmark loss experience. These loans (benchmark loans) had an average ten-year cumulative default rate of 14.9 percent and an average ten-year loss severity of 63.3 percent. The loss rate (default incidence times loss severity in the event of default, without considering the effect of credit enhancements) for this region and time period was 9.4 percent. OFHEO will continue to monitor loss data and may choose to establish a new benchmark loss experience if a higher loss rate for a different region and time period is determined using this methodology.

When the single family models of default and prepayment are applied to the benchmark loans, using the pattern of interest rates from the benchmark time and place, losses are close to those of benchmark loans. The difference results from the fact that OFHEO based its single family default and prepayment models on all Enterprise historical loan data, not just the limited data for benchmark loans for which the losses were particularly severe. This difference provides the basis for calibration factors for each LTV category, which the stress test applies to adjust the single family default rates upward or downward, making them more consistent with the benchmark loss experience. However, because the stress test simulates the performance of an Enterprise's entire mortgage portfolio at a point in time and includes loans of all types, ages, and characteristics, overall Enterprise mortgage loss rates in the stress test can be lower or higher than the loss rates for benchmark loans, even with the calibration adjustment.

Because there were very few Enterprise multifamily loans in the benchmark region and time period, the stress test uses patterns of vacancy rates and rent growth rates that are consistent with the benchmark time and place to determine property income, a key factor in determining defaults for multifamily loans. In this way, the stress test relates the performance of multifamily loans to the benchmark loss experience.

2. Interest Rates

Interest rates are a key component of the adverse economic conditions of the stress test. The 1992 Act specifies two paths for the ten-year Constant Maturity Treasury yield (CMT) during the stress period. During the first year of the stress period, the ten-year CMT:

- Falls by the lesser of 600 basis points below the average yield during the nine months preceding the stress period, or 60 percent of the average yield during the three years preceding the stress period, but in no case to a yield less than 50 percent of the average yield during the preceding nine months (down-rate scenario); or
- Rises by the greater of 600 basis points above the average yield during the nine months preceding the stress period, or 160 percent of the average yield during the three years preceding the stress period, but in no case to a yield greater than 175 percent of the average yield during the preceding nine months (up-rate scenario).

The ten-year CMT changes in twelve equal monthly increments from the starting point, which is the average of the daily ten-year CMT yields for the month preceding the stress period. The ten-year CMT stays at the new level for the remainder of the stress period.

The stress test establishes the Treasury yield curve for the stress period in relation to the prescribed movements in the ten-year CMT. In the down-rate scenario, the yield curve is upward sloping during the last nine years of the stress period; that is, short term rates are lower than long term rates. In the up-rate scenario, the Treasury yield curve is flat for the last nine years of the stress period; that is,

[23] DCR is the ratio of net operating income to mortgage payment for a specific property.

[24] ''Old book'' loans are those originated before 1988 for Fannie Mae and before 1993 for Freddie Mac. All other multifamily loans are considered ''new book'' loans.

yields of other maturities are equal to that of the ten-year CMT.

Because many different interest rates affect the Enterprises' business performance, the ten-year CMT and the Treasury yield curve are not the only interest rates that must be determined. For example, current mortgage rates impact prepayment rates; adjustable-rate mortgages periodically adjust according to various indexes; floating rate securities (assets and liabilities) and many rates associated with derivative contracts also adjust; and appropriate yields must be established for new debt and investments issued during the stress test. Thus, the stress test requires rates and indexes other than Treasury yields for the entire stress period. Some of the key rates that are used in the stress test are the Federal Funds Rate, London Inter-Bank Offered Rate (LIBOR), Federal Home Loan Bank 11th District Cost of Funds Index (COFI), and the Enterprise Cost of Funds. The stress test establishes these rates and indexes using an average of the ratio of each non-Treasury spread to its comparable CMT (the proportional spread) for the two-year period prior to the start of the stress test. Indexes of mortgage interest rates are calculated using the average absolute basis-point spread for the same two-year period.

3. Property Values

The 1992 Act requires OFHEO to consider the effect of loan ''seasoning,'' which is defined as the change in LTVs over time.[25] The analogous multifamily measure is current debt-service-coverage ratio (DCR).

For single family loans, the stress test updates the original LTV to the start of the stress period, using the amortized loan balance and a house price growth factor for the period between origination and the start of the stress period. The house price growth factor is derived from OFHEO's House Price Index (HPI) for the Census Division in which the property is located. The stress test then applies the pattern of house price changes from the benchmark time and place to compute changes in property values during the stress period. The HPI values represent average property value appreciation. In simulating mortgage performance, the stress test also captures variations from average house price movements, called dispersion. For this purpose, the stress test uses dispersion parameters for the Census Division containing most benchmark states, which OFHEO published along with the HPI for the third quarter, 1996.

[25] 12 U.S.C. 4611(d)(1).

Multifamily property values are not updated in the stress test. LTV at loan origination is the only variable that measures property values directly in the multifamily model. If the original LTV is unknown, LTV at loan acquisition is substituted. The effect of seasoning on multifamily loans is captured by projecting changes in property income during the stress period, based upon rent and vacancy indexes consistent with the benchmark time and place.

When the ten-year CMT increases by more than 50 percent over the average yield during the nine months preceding the stress period, the stress test takes general price inflation into consideration. In such a circumstance, adjustments are made to the house price and rent growth paths during the stress period that correspond to the difference between the ten-year CMT and the level reflecting a 50 percent increase in the ten-year CMT. The stress test phases in this increase in equal monthly increments during the last five years of the stress period.

D. Mortgage Performance

To simulate mortgage performance during the adverse conditions of the stress period, the stress test uses statistical models that project default, prepayment and loss severity rates during the stress period. These models simulate the interaction of the patterns of house prices, residential rents, and vacancy rates from the benchmark time and place with stress test interest rates and mortgage risk characteristics, to predict the performance of Enterprise loans throughout the stress test. The default and prepayment models calculate the proportion of the outstanding principal balance for each loan group that defaults or prepays in each of the 120 months of the stress period. As described below in further detail, the models are based on the historical relationship of economic conditions, mortgage risk factors, and mortgage performance, as reflected in the historical experience of the Enterprises.

1. Single Family Default and Prepayment

The single family mortgage performance models were estimated using available historical data for the performance of Enterprise loans in the years 1979–1999. To simulate defaults and prepayments, the stress test uses a 30-year fixed-rate loan model, an adjustable-rate loan (ARM) model, and a third model for other products, such as 15-year loans and balloon loans. Each of the three single family models was separately estimated based on data for the relevant product types[26] and includes a calibration adjustment by LTV category, so that the results properly reflect a reasonable relationship to the benchmark loss experience, as described earlier.

All three single family models simulate defaults and prepayments based on the projected interest rates and property values, as described above, and variables capturing the mortgage risk characteristics described below. Certain variables are used only in prepayment equations. The single family default and prepayment variables are listed in Table 1.

TABLE 1.—SINGLE FAMILY DEFAULT & PREPAYMENT VARIABLES

Variables for All Single Family Models	Single Family Default Variables	Single Family Prepayment Variables
Mortgage Age	X	X
Original LTV	X	X
Probability of Negative Equity	X	X
Burnout	X	X
Occupancy Status	X	X
Relative Spread	.....	X
Yield Curve Slope	.....	X
Relative Loan Size	.....	X
Product Type (ARMs, Other Products only)	X	X
Payment Shock (ARMs only)	X	X
Initial Rate Effect (ARMs only)	X	X

• Mortgage Age—Patterns of mortgage default and prepayment have characteristic age profiles; defaults and prepayments increase during the first years following loan origination, with a peak between the fourth and seventh years.

• Original LTV—The LTV at the time of mortgage origination serves as a proxy for factors relating to the financial status of a borrower, which reflects the

[26] Historical data sets for the ARM and other single family product models were pooled with data for 30-year fixed-rate loans to capture performance differences specific to product types relative to 30-year fixed-rate loans.

borrower's future ability to make loan payments. Higher original LTVs, which generally reflect fewer economic resources and greater financial risk, increase the probability of default and lower the probability of prepayment. The reverse is true for lower original LTVs.

• Probability of Negative Equity—Borrowers whose current loan balance is higher than the current value of their mortgaged property (reflecting negative borrower equity) are more likely to default than those with positive equity in their properties. The probability of negative borrower equity within a loan group is a function of (1) house price changes (based on the HPI), and amortization of loan principal, which together establish the average current LTV, and (2) the dispersion of actual house prices around the HPI value. Thus, even when the average current LTV for a loan group is less than one (positive equity), some percentage of the loans will have LTVs greater than one (negative equity).

• Burnout—This variable reflects whether a borrower has passed up earlier opportunities to refinance at favorable interest rates during the previous eight quarters. Such a borrower is less likely to prepay the current loan and refinance, and more likely to default in the future.

• Occupancy Status—This variable reflects the higher probability of default by investor-owners compared with that of owner-occupants. The RBC Report specifies the proportion of investor loans for each loan group.

• Relative Spread—The stress test uses the relative spread between the interest rate on a loan and the current market rate on loans as a proxy for the mortgage premium value, which reflects the value to a borrower of the option to prepay and refinance.

• Yield Curve Slope—This variable measures the relationship between short and long term interest rates. The shape of the yield curve, which reflects expectations for the future levels of interest rates, influences a borrower's decision to prepay a mortgage.

• Relative Loan Size—This variable reflects whether a loan is significantly larger or smaller than the State average. Generally, lower balance loans are less likely to refinance (and therefore prepay) because refinancing costs are proportionately larger, and the interest savings are proportionately smaller, than a larger balance loan.

• Product Type—The differences in performance between 30-year fixed-rate loans and other products, such as ARM and balloon loans, are captured by this variable.

• Payment Shock—This variable captures the effect of increasing or decreasing interest rates on the payments for ARMs. Although a borrower with an ARM loan may still have positive equity in the mortgaged property, the borrower may be unable to make a larger monthly payment when interest rates increase, resulting in increases to ARM default and prepayment rates. Conversely, decreasing interest rates make it easier for borrowers to make monthly payments, resulting in lower ARM default and prepayment rates.

• Initial Rate Effect—Borrowers with ARM loans with a ''teaser rate'' (an initial interest rate lower than the market rate) may experience payment shock even if market rates do not rise, as the low teaser rate adjusts to the market rate over the first few years of the loan. The stress test includes a variable which captures this effect in the first three years of the life of the loan.

2. Multifamily Default and Prepayment

The stress test uses a statistical model for multifamily default and a set of simple rules for multifamily prepayment. The default model was estimated using historical data through 1999 on the performance of Enterprise multifamily loans. As with the models of single family mortgage performance, the multifamily default model simulates the probability of default based on stress test conditions and loan group risk characteristics. To account for specific risks associated with multifamily loans, these loans are grouped somewhat differently than are single family loans and have somewhat different explanatory variables, to characterize stress test conditions. To characterize stress test conditions, the multifamily model specifies interest rates, rent growth rates, and vacancy rates.

The following variables are factors in determining the probability of default for multifamily loan groups:

• Mortgage Age—As with single family loans, the risk of default on multifamily loans varies over their lives.

• New Book Flags—These variables capture the performance differences between the Enterprises' original multifamily programs and their current, restructured programs. The reduced default risk under the ''new book of business'' is more pronounced for fixed rate loans than for balloon loans and ARMs, which are flagged separately.

• Current DCR and Underwater DCR Flag—Rental property owners tend not to default unless a property's debt coverage ratio (DCR) is less than one, indicating insufficient net cash flow to service the mortgage debt. The stress test updates the DCR of multifamily loans during the stress period using rent and vacancy indexes consistent with the benchmark loss experience. The higher the DCR, the less likely that the borrower will default. Conversely, a DCR below one indicates that the borrower cannot cover the mortgage payment, significantly increasing the risk of default.

• Original LTV—As with single family loans, the risk of default for multifamily loan borrowers is greater for higher original LTV loans than for lower original LTV loans.

• Balloon Maturity Risk—When a balloon mortgage matures, the borrower is required to pay off the outstanding balance in a lump sum. This variable captures the greater risk of default in the year before a balloon mortgage matures.

• Ratio Update Flag—This variable captures the decreased probability of default if the DCR and LTV were either calculated at loan origination, or recalculated at Enterprise acquisition, in accordance with current Enterprise standards.

To project prepayment rates for multifamily loans, the stress test implements a simple set of prepayment rules. In the up-rate scenario, multifamily loans do not prepay. In the down-rate scenario, two percent of multifamily loan balances prepay each year if they are inside the prepayment penalty time period. Outside the prepayment penalty period, multifamily loans prepay at an annual rate of 25 percent.

3. Loss Severity

Loss severity is the net cost to an Enterprise of a loan default. The stress test uses the costs associated with different events following the default of a mortgage to determine the total loss or cost to an Enterprise. Loss severity rates are computed as of the date of default, and are expressed as a percentage of the unpaid principal balance (UPB) of a defaulting loan.

In general, losses are composed of three elements associated with loan foreclosure and disposition (sale) of the property: loss of principal, transactions costs, and funding costs. Transaction costs include expenses related to foreclosure, property holding costs (real estate owned or REO costs) and disposition costs. For single family loans, transactions costs are fixed percentages based on historical averages computed from Enterprise data. For multifamily loans, transactions costs are based on the average costs through 1995 from Freddie Mac old book loans (*See* Footnote 24).

Loss of principal is the amount of defaulting loan UPB, offset by the net proceeds of the sale (disposition) of the foreclosed property. For single family loans, sale proceeds of foreclosed properties are a fixed percentage of defaulting UPB, based on benchmark recovery rates for real estate owned as a result of loan defaults (REO).[27] For multifamily loans, sale proceeds are a fixed percentage of the defaulting UPB, based on REO recovery rates from Freddie Mac old book loans through 1995.

Since foreclosure, property holding, disposition and associated costs occur over time, the stress test calculates loss severity rates by discounting the different elements of loss back to the time of default, based on stress period interest rates. This discounting also captures losses associated with funding costs, including passthrough interest on sold loans, at appropriate interest rates. For single family loans, the timing of each element is based on averages for the benchmark loans; for multifamily loans it is based on the average for Freddie Mac Old Book loans, using REO data through 1995. The loss severity rates are used in the cash flow components of the stress test to calculate credit losses for the Enterprises.

E. Other Credit Factors

1. Mortgage Credit Enhancements

A portion of Enterprise mortgage losses are offset by some form of credit enhancement. Credit enhancements are contractual arrangements with third parties that reduce Enterprise losses on defaulted loans. By including the effect of mortgage credit enhancements, the stress test more realistically reflects Enterprise risks related to mortgage defaults and credit losses during the stress period.

The stress test captures many types of credit enhancements, with differing depths and methods of coverage, for both single family and multifamily loans. The stress test divides mortgage credit enhancements into two categories—loan limit and aggregate limit. Loan limit credit enhancements cover a specified percentage of losses on individual loans with no limit on the aggregate amount paid under the contract. This category includes mortgage insurance for single family loans and loss-sharing agreements for multifamily loans. Aggregate limit credit enhancements cover losses on a specified set of loans, up to a specified aggregate amount. This category includes limited and unlimited recourse to seller/servicers, indemnification, pool insurance and modified pool insurance, cash or collateral accounts, third-party letters of credit, spread accounts, subordination agreements, and FHA risk-sharing.

The amount by which credit enhancements reduce monthly loss severity rates is based on information reported by the Enterprises in the RBC Report for the level of coverage for both loan limit and aggregate limit credit enhancements for each loan group. The stress test applies loan limit credit enhancements first. Then aggregate limit credit enhancements are applied to the remainder of the loss balance, up to the contractual limit. The stress test reduces the loss severity rate for a specific loan group based on the combined loan limit and aggregate limit credit enhancements associated with loans in that group.

2. Counterparty Default

In addition to mortgage credit quality, the stress test considers the creditworthiness of companies and financial instruments to which the Enterprises have credit exposure. These include most mortgage credit enhancement counterparties, securities held as assets, and derivative contract counterparties.

For these contract or instrument counterparties, the stress test reduces—or applies ''haircuts'' to—the amounts due from these instruments or counterparties according to their level of risk. The level of risk is determined by public credit ratings at the start of the stress test, classified into five categories: AAA, AA, A, BBB and unrated/below BBB. When no rating is available or the instrument or counterparty has a rating below BBB (below investment grade), the stress test applies a 100 percent haircut in the first month of the stress test, with the exception of unrated seller/servicers, which are treated as BBB, and unrated, unsubordinated obligations of government sponsored enterprises, which are treated as AAA. For other categories, the stress test phases in the haircuts monthly in equal increments until the total reduction listed in Table 2 is reached five years into the stress period. For the remainder of the stress period the haircut applies.

TABLE 2.—STRESS TEST FINAL HAIRCUTS BY CREDIT RATING CATEGORY

Ratings Classification	Derivative	Non-derivative
AAA	2%	5%
AA	4%	15%
A	8%	20%
BBB	16%	40%
Unrated/Below BBB [1]	100%	100%

[1] Unrated, unsubordinated obligations issued by government sponsored enterprises other than the reporting Enterprise are treated as AAA. Unrated seller/servicers are treated as BBB. Other unrated counterparties and securities are subject to a 100% haircut applied in the first month of the stress test, unless OFHEO specifies another treatment, on a showing by an Enterprise that a different treatment is warranted.

Because the stress test does not model currency exchange rates through the stress period, the stress test reflects the associated risk by modeling the debt and the swap as a single debt transaction that pays the dollar-denominated net interest rate paid by the Enterprise, and no haircut is applied.

F. Cash Flows

For each month of the stress period, the stress test calculates cash flows for every loan group and individual instrument reported in the RBC Report and applies the haircuts to cash flows to reflect the credit risk of securities and counterparties. These cash flows are used to create pro forma financial statements that reflect an Enterprise's total capital in each month of the stress period.

1. Mortgage Cash Flows

The cash flow component of the stress test applies projected default, prepayment, and loss severity rates net of credit enhancements to amortized loan group balances to produce mortgage cash flows for each month of the stress period. Cash flows are generated for each single family and multifamily loan group. For retained loan groups, cash flows consist of scheduled principal, prepaid principal, defaulted principal, credit losses, and interest. For sold loans, cash flows consist of credit losses, guarantee fee income, and float income.

2. Mortgage-Related Security Cash Flows

Because losses on sold loans are absorbed by the Enterprises directly and are not passed through to security holders, no additional credit losses are

[27] Recovery rate is the proportion of defaulted UPB that is recovered through the sale of the property.

reflected in cash flows calculated for an Enterprise's own mortgage-backed securities (MBSs) held as investments. Cash flows for single-class MBSs issued by an Enterprise and held as investments consist only of principal and interest payments. Cash flows for mortgage securities not issued by the Enterprise consist of principal and interest payments and credit losses based on haircuts according to rating level. Principal payments are calculated by applying default and prepayment rates that are appropriate for the loans underlying the MBS. The stress test specifies that defaulted and prepaid principal and scheduled amortization are passed through to investors. Interest is computed by multiplying the security principal balance by the coupon rate.

Multiclass mortgage securities such as Real Estate Mortgage Investment Conduit securities (REMICs) and stripped MBS (strips) are treated in the same manner as single class MBS. The stress test generates cash flows for the underlying collateral, usually single-class MBSs, and applies the cash flow allocation rules of the particular multiclass security to determine cash flows of the specific class(es) held by an Enterprise. In generating cash flows for mortgage-linked derivative contracts, where the notional amount of the contract is based on the declining principal balance of a specified MBS, the stress test applies the terms of each contract and tracks the appropriate changing balances. The stress test generates cash flows for mortgage revenue bonds by treating each bond as a single-class MBS backed by 30-year, fixed-rate single family mortgages maturing on the bond's stated maturity date.

3. Nonmortgage Instrument Cash Flows

The stress test calculates cash flows for securities that the Enterprises hold as assets, or have issued as liabilities. The stress test also generates cash flows for derivative instruments such as interest rate swaps, caps, and floors. For nonmortgage investments, outstanding debt securities, and liability-linked derivative contracts, payments of principal and interest are calculated for each instrument based on contractual terms and stress test interest rates. For fixed-rate asset-backed securities, the stress test applies a 3.5 percent collateral prepayment speed; for floating-rate securities a two percent speed is applied in both interest rate scenarios.

For each month during the stress period that a security is subject to early redemption (put/call), the stress test calculates the effective remaining yield-to-maturity [28] of that instrument and compares it to the yield of a replacement security, under the given stress period interest rate scenario. If the yield on the replacement instrument is more than 50 basis points below the cost of the existing instrument, the call or cancellation option is exercised. The stress test applies a similar rule to derivative contracts that are subject to cancellation.

G. New Products or Activities

Given the continuing evolution and innovation in the financial markets, OFHEO recognizes that the Enterprises will continue to develop and purchase new products and instruments and engage in other new activities. To the extent that the current stress test treatments are not applicable directly, OFHEO will combine and adapt current stress test treatments in an appropriate manner in order to ensure that the risks of these activities are adequately captured in the risk-based capital requirement. For example, OFHEO might employ the mortgage performance models and adapt its cash flow components to simulate accurately the loss mitigating effects of credit derivatives. Where there is no reasonable approach using existing combinations or adaptations, the stress test will employ an appropriately conservative treatment, consistent with OFHEO's role as a safety and soundness regulator. Similarly, the Director has discretion to treat an existing instrument as a new activity if OFHEO determines there have been significant increases in volume that change the potential magnitude of the risk of the instrument, or where other information indicates that the risk characteristics of the instrument are not appropriately reflected in a treatment previously applied.

An Enterprise that has a new activity is encouraged to suggest a treatment which will be considered by OFHEO. The Enterprise will also be able to comment on OFHEO's treatment before it is used for a final capital classification. The public will have a subsequent opportunity to submit views on these treatments, which will be considered for future stress test applications.

H. Other Off-Balance-Sheet Guarantees

In addition to guaranteeing mortgage-backed securities they issue as part of their main business, the Enterprises occasionally provide guarantees for other mortgage-related securities to enhance the liquidity and appeal of these securities in the marketplace. These securities, notably single family and multifamily whole-loan REMIC [29] securities and tax-exempt multifamily housing bonds, represent a small part of the Enterprises' businesses and have a significant level of credit enhancement that protects the Enterprises from losses. Consequently, the stress test does not explicitly model the performance of these securities, but uses an alternative modeling treatment. As a proxy for the present value of net losses on these guarantees during the stress period, the outstanding balance of these instruments at the beginning of the stress period is multiplied by 45 basis points. The resulting amount is subtracted from the lowest discounted monthly capital balance for the calculation of stress test capital, as described below in II.K., Calculation of the Risk-based Capital Requirement.

I. Alternative Modeling Treatments

The stress test also assigns alternative modeling treatments to any items for which data are incomplete, and any on- or off-balance sheet items for which there is neither a specified treatment in the final regulation nor a computationally equivalent proxy. An alternative modeling treatment is a series of rules that assigns simple, appropriately conservative assumptions, based on the interest rate scenario, to an asset, liability, or off-balance-sheet item in the stress test. Missing data elements are assigned a conservative default value. This treatment will only be needed for extremely unusual items or when all the necessary data for modeling an instrument are not included in the RBC Report.

J. Enterprise Operations, Taxes and Accounting

The stress test simulates the issuance of new debt or purchase of new investments, exercise of options to retire debt early or cancel derivative contracts, payment of dividends by the Enterprises, operating expenses, and income taxes. The stress test computes Federal income taxes using an effective tax rate of 30 percent. Estimated income tax is paid by the Enterprises quarterly in the stress test.

When necessary, the stress test simulates the issuance of new debt or

[28] Yields are calculated based on the outstanding principal balances for securities and notional amounts for derivative contracts.

[29] Real Estate Mortgage Investment Conduit (REMIC) securities are multiclass mortgage passthrough securities. The classes of a REMIC security can take on a wide variety of attributes with regard to payment of principal and interest, cashflow timing, (un)certainty and maturity, among others.

purchase of new investments by an Enterprise. A mix of short- and long-term debt is issued in months when there is a shortfall of cash. New short-term debt is six-month discount notes at the simulated Enterprise Cost of Funds. New long-term debt is five-year debt, callable after the first year, at the five-year Enterprise Cost of Funds, plus a 50 basis-point premium for the call option. Short- and long-term debt issuance is targeted to achieve and maintain a total liability mix of 50 percent short-term debt and 50 percent long-term debt. Excess cash is invested in one-month securities bearing the six-month Treasury rate.

Capital distributions are made during the stress period. If an Enterprise's core capital [30] exceeds the minimum capital requirement in any quarter, dividends on preferred stock are paid based on the coupon rates of the issues outstanding. Common stock dividends are paid only in the first four quarters of the stress period. The amount paid is directly related to the earnings trend of the Enterprise. Generally, if the trend is positive, the dividend payout ratio is the same as the average of the four quarters preceding the stress test. Otherwise, dividends are based on the dollar amount per share paid in the last quarter preceding the stress test. Share repurchases are made in the first two quarters of the stress period, based on the average stock repurchase for the four quarters preceding the stress test. No capital distribution is made if core capital is below the minimum capital requirement. If a capital distribution would cause core capital to fall below the minimum capital requirement, the distribution is made only to the extent of the core capital that exceeds the minimum capital requirement.

Operating expenses decline during the stress test as the Enterprise's mortgage portfolios decline, but the decline is not strictly proportional. The baseline level from which they decline is the average monthly operating expenses of the Enterprise for the three months preceding the start of the stress test. In each month of the stress test, the amount of the decline is determined by computing a base amount comprised of a fixed component and a variable component. The fixed component is one third of the baseline level, and the variable component begins as the remaining two thirds of the baseline level and declines in direct proportion to the decline in the UPB of the combined portfolios of retained and sold loans during the stress period. The base amount is further reduced by one-third, except that this further reduction is gradually phased in during the first 12 months of the stress test.

To the extent possible, the stress test makes use of Generally Accepted Accounting Principles (GAAP). However, the stress test does not reflect certain securities and derivatives at their fair value, as required by the Financial Accounting Standards Board's Statement of Financial Accounting Standard (FAS) Nos. 115 and 133. In the first month of the stress test, these assets are adjusted to an amortized cost basis.

K. Calculation of the Risk-Based Capital Requirement

The stress test determines the amount of capital that an Enterprise must hold at the start date in order to maintain positive capital throughout the ten-year stress period (stress test capital). Once stress test capital has been calculated, an additional 30 percent is added to protect against management and operations risk. This total is the risk-based capital requirement.

In order to calculate stress test capital, the capital balance for each month is discounted back to the start of the stress period, using capital as calculated in the pro forma financial statements and interest rates for both stress test scenarios. The stress test uses the six-month Treasury rate when the Enterprise is a net lender and the six-month Enterprise Cost of Funds when the Enterprise is a net borrower. The lowest discounted monthly capital balance is then decreased as described above to account for certain items given alternative modeling treatments, including the other off-balance-sheet obligations described above in II.H., Other Off-Balance-Sheet Guarantees. This lowest discounted monthly balance, if positive, represents a surplus of initial capital, that is, capital that was not ''used'' during the stress period. If negative, it represents a deficit of initial capital. The lowest discounted monthly balance is then subtracted from the Enterprise's initial capital. The resulting amount is the smallest amount of starting capital required to maintain positive capital throughout the stress period.

For example, if an Enterprise holds starting capital of $10 billion and the lowest discounted monthly balance is $1 billion (representing a positive capital balance in the worst month of the stress period), then the amount of starting capital necessary to maintain positive capital throughout the stress period is $9.0 billion. If, on the other hand, the lowest discounted monthly balance is −$1 billion (representing a negative capital balance in the worst month), the necessary starting capital to maintain positive capital throughout the stress period is $11.0 billion.

Finally, required starting capital is multiplied by 1.3 to complete the calculation of the risk-based capital requirement required by the 1992 Act.

III. Comments and Responses

The final rule reflects OFHEO's consideration of all the comments on NPR1 and NPR2, including responses from those commenters who replied to the initial comments on NPR2. After careful review and analysis of the comments, OFHEO determined that a number of recommendations had merit. OFHEO accepted these recommendations and made changes in the stress test accordingly. In other cases where commenters recommended changes, OFHEO did not accept the specific suggestion, but modified the stress test to address the commenters' concerns. Other recommendations proved to be contrary to the 1992 Act, did not offer a better alternative to the existing stress test, or had merit but required further study before they could be implemented.

The commenters on NPR1 and NPR2 included the Enterprises, financial services and housing-related trade associations, financial service companies, affordable housing groups and agencies, a governmental agency, a private rating agency and several individuals.

Trade associations commenting included American Bankers Association (ABA), America's Community Bankers (ACB), Consumer Mortgage Coalition (CMC), Mortgage Bankers Association of America (MBA), Mortgage Insurance Companies of America (MICA), National Association of Home Builders (NAHB), National Association of Realtors (NAR), Credit Union National Association (CUNA), National Bankers Association (NBA), National Association of Real Estate Brokers (NAREB), and National Home Equity Mortgage Association (NHEMA).

Financial services companies commenting included GE Capital Mortgage Corporation (GE Capital), Chase Manhattan Mortgage Corporation, Charter One Bank, Goldman Sachs, Newport Mortgage Company L.P., J.P. Morgan & Co. Incorporated, Bear Stearns & Co. Inc., Morgan Stanley Dean Witter (Morgan Stanley), Lehman Brothers, Salomon Smith Barney, Triad Guaranty Insurance Corporation, Merrill Lynch, Promentory Financial Group LLC, PW

[30] Core capital, as defined at 12 U.S.C. 4502(4) consists of par value or stated value of outstanding common, and perpetual, noncumulative, preferred stock, paid-in capital, and retained earnings, determined in accordance with Generally Accepted Accounting Principles.

Funding Inc., Amresco Capital, L.P., Golden West Financial Corporation (World Savings), Countrywide (Mid-America Bank FSB), American International Group Inc. (AIG), the Federal Home Loan Bank of Chicago, and WMF Group.

Affordable housing groups and agencies included The Enterprise Foundation and the Local Initiatives Support Corporation, National Center for Community Self Help, National Council of State Housing Agencies (NCSHA), Association of Local Housing Finance Agencies, Nebraska Investment Finance Authority, Neighborhood Housing Services of America, Inc., National Association of Affordable Housing Lenders (NAAHL), PT & Associates Community Development Consulting, National Neighborhood Housing Network, National Community Reinvestment Coalition, and Coalition on Homelessness & Housing in Ohio.

Other commenters included Office of Thrift Supervision, Fitch ICBA, Nelson Yu, O'Melveny & Myers LLP, and L. William Seidman.

A summary of the comments and OFHEO's responses are set forth below, by topic.

A. Approach

Commenters generally agreed on the basic premises underlying OFHEO's proposal to implement a risk-based capital requirement for the Enterprises: the importance to the nation's housing finance system of financially strong Enterprises, and the appropriateness of the weight the 1992 Act places on a risk-based capital requirement to protect the Enterprises' capital adequacy. The views of commenters, however, diverged on the question of whether a stress test, such as the one proposed in NPR2, provided the best approach to setting a risk-based capital requirement for the Enterprises. Among the commenters who agreed that a stress test was the best approach, the views diverged on the question of how the stress test should be implemented. The general comments on OFHEO's approach are discussed below by topic.

1. Bank and Thrift Approach

a. Comments

Some commenters suggested that OFHEO take an overall approach to capital regulation similar to that emerging among the bank and thrift regulators and the Basel Committee on Banking Supervision. The suggestions of these commenters included using ratios to set capital requirements for credit risk and Value at Risk (VaR) methodologies for market risk rather than a stress test. One Enterprise and one commenter, however, noted that although VaR methodology is a valuable analytical tool, it is not appropriate for determining risk-based capital as prescribed by the 1992 Act.

The approach evolving in the bank regulatory community applies ratios to categories of on- and off-balance-sheet items to derive capital requirements, but also begins to incorporate VaR and other methodologies that financial institutions employ in their proprietary models. The approach, which is outlined in the June 1999 report by the Basel Committee on Banking Supervision (Committee) titled ''A New Capital Adequacy Framework,'' also puts more emphasis on supervisory review and greater market discipline based on expanded disclosure of risk. The June 1999 report discusses a new capital framework consisting of three ''pillars'': minimum capital requirements, a supervisory review process, and market discipline.

The three pillars approach to bank regulatory capital seeks to improve the relationship of bank capital requirements to risk that was set out in the 1988 Accord. The 1988 Accord was itself a major departure from the simple leverage ratios applied by regulators to total assets. It introduced a capital framework that applied ratios to broad categories of assets according to their relative riskiness as reflected by type of instrument (e.g., residential mortgages, commercial loans, or lines of credit) or by obligor (e.g., sovereign government, national bank, or industrial company). At the time the Accord was introduced, the Committee recognized the limitations inherent in quantifying credit risk by applying ratios to such broad categories of assets. The Committee also recognized that credit risk was only one element of the risk profile of a financial institution. Subsequent enhancements, most notably permitting the use of proprietary models to calculate a supplemental capital requirement reflecting the market risk of a large financial institution's trading portfolio, have continued to improve the process of quantifying risk and calculating an appropriate level of capital based on risk.

In January of 2001, the Committee published for comment a proposal embodying the three pillars to replace the 1988 Accord.[31] The proposal is intended to be a more risk-sensitive framework containing a range of new options for measuring both credit and operational risk. Key elements of the proposal were a refinement of the minimum capital requirement to make it more risk-sensitive, a greater emphasis on the bank's own assessment of its risk, and a decision to treat interest rate risk under the second pillar, the supervisory review process.The proposal described a ''foundation'' or standardized approach to credit risk, which was a refinement of the 1988 approach to minimum capital, and an ''advanced'' internal ratings-based approach for banks that meet more rigorous supervisory standards. The latter made use of internal estimates, subject to supervisory review, but stopped short of permitting banks to calculate their capital requirements on the basis of their own portfolio credit risk models. Separate disclosure requirements were set forth as prerequisites for supervisory recognition of internal methodologies for credit risk, credit risk mitigation techniques, and asset securitization. The Committee indicated that similar disclosure prerequisites would attach to the use of advanced approaches to operational risk.

After reviewing the comments on the January 2001 proposal, the Committee announced in June of 2001 that the proposal needs further adjustment to maintain equivalency between the two approaches and to ensure that the capital incentives are appropriate to encourage banks to adopt the more advanced approaches.[32] The Committee reaffirmed its support for the three pillars approach and announced that it would release a complete and fully specified proposal for an additional round of consultation in early 2002, with a target implementation date of 2005.

b. OFHEO's Response

Although the 1992 Act requires a risk-based capital standard for the Enterprises that is based on a stress test, OFHEO's overall approach to regulation is broadly parallel to the three pillars approach proposed by the Committee. OFHEO already pursues a ''multidimensional'' approach to regulating the Enterprises' capital, as one commenter urged. OFHEO's minimum and risk-based capital requirements are quantifiable capital requirements, which are the goals of the Committee's first pillar; OFHEO employs risk-based examination and

[31] Committee on Banking Supervision, ''Overview of the New Basel Capital Accord,'' Bank for International Settlements, Basel, Switzerland (January 2001). A copy of this document can be obtained from the BIS website at *http://www.bis.org.*

[32] See press release of June 25, 2001, ''Update of the New Basel Accord.'' A copy of this document may be obtained on the BIS website at *http://www.bis.org.*

oversight of the Enterprises that provides the type of oversight contemplated in the second pillar; and OFHEO is currently reviewing the Enterprises' public disclosures to determine whether they would provide an adequate basis for market discipline as contemplated in the third pillar.

Although OFHEO will follow with interest the Committee's progress in developing a new regulatory capital framework and, where appropriate, consider incorporating aspects of this new framework into its regulation of the Enterprises, OFHEO believes that its stress test is appropriate to implement the statutory requirements and ties capital more closely to risk than either the current Basel Accord or recent proposals. The current capital adequacy regime for large banks quantifies credit risk by applying ratios to risk-weighted asset and off-balance-sheet amounts and quantifies market risk only to the extent of the interest rate risk in the banks' trading portfolios. In refining the treatment of credit risk, the Committee's three pillars approach would continue to rely on ratios. Interest rate risk would be addressed under the second pillar, the supervisory review process. By contrast, OFHEO's stress test simultaneously captures credit risk and interest rate risk of an Enterprise's entire business.

OFHEO also believes that VaR methodologies that large banks use to evaluate the interest rate risk of their trading portfolios are not adequate to implement the requirements of the 1992 Act. VaR approaches are best used to evaluate risk over relatively short time periods and are, therefore, appropriate for evaluating trading portfolios. The Enterprises' asset portfolios, however, are not a ''trading book,'' as one commenter suggested. Rather, these portfolios are comprised largely of assets that are held to maturity. The Enterprises' actual trading portfolios are, in fact, a small part of the Enterprises' balance sheets. Further, although large banks continue to use VaR models for calculating day-to-day trading risk, since the disruptions in the global financial markets in 1997 and 1998, these banks increasingly have employed stress tests to measure their market exposure.[33] These banks found that VaR models were less able to measure risk under extreme market conditions than stress tests.

2. Proprietary/Internal Models

a. Comments

Some of the commenters who recommended the bank and thrift regulatory approach urged that OFHEO permit the Enterprises to use their proprietary models to determine interest rate risk. A number of other commenters contended that each Enterprise should calculate its own risk-based capital requirement using a stress test model specified by OFHEO but developed by the Enterprise. Each Enterprise would then report its risk-based capital requirement to OFHEO in the same manner as the minimum capital requirement is reported. All of these commenters suggested that OFHEO could ensure the integrity of the capital calculation process through its examination function. In arguing for the use of internal models, one commenter also noted that the risk-based capital proposals of the Farm Credit Administration (FCA) and the Federal Housing Finance Board (FHFB) also permit the use of proprietary and/or internal models to varying degrees.

Both Enterprises agreed that they should calculate their own risk-based capital requirement, contending that it is sufficient for OFHEO to publish the specifications for the model. They recommended that they should run the stress test as specified by OFHEO on their own internal systems, at least as a transitional measure. The Enterprises believe this would be the fastest and most efficient way to implement a risk-based capital rule that would produce capital numbers in a timely way.

Other commenters believed that allowing an Enterprise to calculate its own capital requirement using its proprietary models or a model that OFHEO specifies would undermine OFHEO's regulatory independence and impede the transparency of the stress test for third parties. These commenters felt that OFHEO must retain control of both the model and the process for determining the Enterprises' risk-based capital requirements to ensure the integrity of the calculation of risk-based capital.

The Congress has required FCA, which regulates the Federal Agricultural Mortgage Corporation (Farmer Mac), and FHFB, which regulates the Federal Home Loan Banks, to establish risk-based capital standards for the entities they regulate. The statutory requirements for FCA's risk-based capital regulation,[34] which parallel the requirements of the 1992 Act, include a ten-year stress test, a worse-case historical credit loss experience, and stressful interest rate scenarios. The FCA rule specifies the basic structure and parameters of the risk-based capital stress test and allows Farmer Mac to use FCA's spread sheet model or implement the stress test using an internal model built to FCA's specifications to determine its risk-based capital requirement.[35]

The statutory requirements for FHFB's recently adopted capital regulation,[36] which takes an approach similar to that of the bank and thrift regulators, are much less specific than either OFHEO's or FCA's, but direct FHFB to take OFHEO's stress test into consideration. In the FHFB rule, each Federal Home Loan Bank calculates its own risk-based capital charge.[37]

b. OFHEO's Response

The final rule continues to provide for capital classifications to be determined based on a stress test specified, developed, and administered by OFHEO. OFHEO believes this approach best fulfills the statutory purposes and maintains the integrity of the risk-based capital regulation. Allowing the Enterprises to use their proprietary models or models they develop based

[33] Committee on the Global Financial System, ''Stress Testing by Large Financial Institutions: Current Practice and Aggregation Issues,'' 14 Bank for International Settlements, Basel, Switzerland (April 8, 2000). A copy of this document may be obtained from the BIS website at *http://www.bis.org.*

[34] 66 FR 19048, April 12, 2001. FCA's rule determines stressful credit conditions by applying loss frequency and severity equations to Farmer Mac's loan-level data. From these equations, FCA's test calculates loan losses, assuming Farmer Mac's portfolio remains at a ''steady state,'' and allocates the calculated losses to each of the ten years. Interest rate risk is quantified using the results of Farmer Mac's interest rate risk shock-test to determine the change in the market value of equity (MVE). The change in MVE is posted to the first period in the stress test.

[35] In its notice of proposed rulemaking, FCA noted ''that because of the proprietary nature of specific, transaction loan level and financial data used in the risk-based capital stress test, it is unlikely that results of the test will be fully reproducible by parties other than Farmer Mac and us. Other parties, however, will be able to approximate the test results on an aggregate basis using publicly available information.'' 64 FR 61741, November 12, 1999.

[36] 12 FR 8262, Jan. 30, 2001; 12 CFR parts 915, 917, 925, 930, 931, 932, 933, 956, and 960.

[37] Capital to cover credit risk is calculated from leverage ratios that are based upon the credit ratings of counterparties and collateral supporting the credit. 66 FR 8313 (Jan. 30, 2001). Market risk capital is based on internal VaR models or stress tests and a determination of the amount by which the current market value of a Federal Home Loan Bank's total capital is less than 85 percent of the book value of total capital. *Id.* at 8317. Capital for operations risk is 30 percent of credit risk capital, although the FHFB may approve a lesser amount (not less than 10 percent) where the Federal Home Loan Bank obtains appropriate insurance or provides an acceptable alternative method for assessing and quantifying operations risk capital. *Id.* at 8318.

on OFHEO's specifications to calculate their own capital requirements could result in a weaker and inconsistently applied standard. However, each Enterprise will receive the source code for the stress test, which will enable it to compute its own capital requirement for internal purposes and to comment on its proposed capital classification.

Although FCA's statutory framework is similar to the 1992 Act, statutory interpretations that are appropriate for FCA's statute are not necessarily appropriate interpretations of the 1992 Act, and differences in regulatory responsibilities make the FCA approach unworkable for OFHEO. FCA is charged with developing a stress test for a single entity, while OFHEO regulates two entities, both of which must be subject to the same stress test.[38] Models that the Enterprises develop themselves would inevitably differ in their details, which could result in significant variations, and make it difficult to apply the stress test consistently to both Enterprises. In addition, the 1992 Act requires that the stress test be set forth in a regulation subject to notice and comment rulemaking,[39] that the risk-based capital regulation be sufficiently specific to permit someone other than the Director to apply the test,[40] and that OFHEO make the stress test model publicly available.[41] For these reasons, OFHEO concluded that the most practical way to comply with these statutory provisions was to develop and administer its own model on its own systems and apply the stress test even-handedly to both Enterprises.

Use of the FHFB approach is not viable for OFHEO under the 1992 Act, which requires a specific stress test, and does not provide the option of allowing each institution to design an appropriate risk-based capital test. The FHFB compared the agencies' approaches in the preamble to its final rule, noting that ''[f]or example, the GLB Act requires that the [FHFB] develop a stress test that rigorously tests for changes in interest rates, interest rate volatility and changes in the shape of the yield curve, while the statutory requirements governing Fannie Mae and Freddie Mac set forth specific scenarios for downward and upward shocks in interest rates.'' [42] Other examples of statutory differences include the requirement in the 1992 Act that credit losses be related to the benchmark loss experience and an extensive list of factors that OFHEO must consider in designing the stress test. Further, the procedural requirements that the details of the stress test be published by regulation and made available to the public also make an internal models approach impractical for OFHEO.

OFHEO also finds that regulatory independence and rigor is best served by OFHEO's approach. The availability of the stress test on OFHEO's systems allows OFHEO greater flexibility to run the stress test whenever it may be needed. Maintaining the infrastructure to support the stress test also gives OFHEO the ability to independently test alternative risk scenarios in addition to the two stress test scenarios, which ensures the integrity of the stress test. This capability will also permit OFHEO to test possible improvements and adjustments to the stress test.

In sum, OFHEO concurs with the concerns of the commenters who recommended that OFHEO develop and maintain a single stress test model and require the Enterprises to provide the necessary data for the stress test. The Enterprises certainly may replicate that model from OFHEO's model specifications and computer code and use it to determine the capital impact of various business decisions. For the purposes of determining the capital classifications, however, OFHEO will run its own model using data submitted by the Enterprises. To alleviate some of the Enterprises' concern about the ability of the model to produce accurate capital numbers in a timely way, the final regulation establishes a standardized data reporting format for the RBC Report. This Report will enable OFHEO to produce capital numbers within the regulatory time frame. *See* sections III.B., Operational Workability of the Regulation and III.E., Enterprise Data.

3. Mark to Market for ''Tail Risk''

a. Comments

Two commenters said that OFHEO should consider losses beyond the end of the stress test period, either by marking to market remaining positions or otherwise requiring additional capital to cover the risk that remained at the end of the ten-year stress period. One Enterprise responded that marking to market to capture this ''tail risk'' would be contrary to the 1992 Act.

b. OFHEO's Response

The final regulation does not adopt the commenters' suggestions to require capital for on- and off-balance-sheet items that remain at the end of the ten-year stress period or to mark these items to their market value. The 1992 Act specifies that the stress period is ten years and that total capital must meet or exceed the amount of capital necessary to survive the stress period with positive capital. Marking to market balance sheet items that remain at the end of the 120 month period would bring into the stress test period earnings or losses beyond the ten-year period and would be inconsistent with the 1992 Act.

4. Additional Interest Rate Scenarios

a. Comments

Several commenters suggested that OFHEO study additional interest rate scenarios to ensure that smaller changes in interest rates do not result in risk-based capital requirements that are larger than the requirements generated by the interest rate scenarios in the 1992 Act. These commenters expressed concern that the risk-based capital rule will be inadequate unless OFHEO runs more than two interest rate scenarios. They also urged OFHEO to monitor any attempts by the Enterprises to take advantage of the limited number of interest rate scenarios in the stress test. The comment implies, for example, that an Enterprise could enter into inexpensive interest rate derivatives contracts that would allow the Enterprise to easily pass the two interest rate scenarios of the stress test. Under slightly different and possibly less stressful interest rate scenarios, these derivatives might be useless, but a stress test based on only two interest rate scenarios would not uncover this deficiency. To prevent this problem, the commenters said that OFHEO should run additional scenarios with a variety of assumptions, including combinations of smaller interest rate changes, more volatile interest rates, different yield curves, and alternative changes in house prices. They recommended that OFHEO set the risk-based capital requirement for an Enterprise at the highest amount generated by any additional scenarios. One Enterprise disagreed, saying that more moderate interest rate movements would probably result in lower capital requirements. The Enterprise also noted that OFHEO's examination process

[38] *See* 12 U.S.C. 4611(a) (''The Director shall, by regulation, establish *a* risk-based capital test for the Enterprises. When applied to an Enterprise, *the* risk-based capital test shall determine the amount of total capital for the Enterprise * * *'') (emphasis added). See also H.R. Rep. No. 102–206 at 62 (1991). ''Beyond these traditional capital ratios, the bill sets forth guidelines for the creation, in highly specific regulations, of a risk-based capital standard * * * *The* model, or stress test, will generate a number for each Enterprise, which will become the risk-based standard for that Enterprise.'') (emphasis added).

[39] 12 U.S.C. 4611(e)(1).

[40] 12 U.S.C. 4611(e)(2).

[41] 12 U.S.C. 4611(f).

[42] 66 FR at 8283.

ensures the integrity of Enterprises' risk management process.

b. OFHEO's Response

In response to these comments, OFHEO notes that the 1992 Act provides only two scenarios for the stress test and requires that risk-based capital be based on whichever of the two scenarios results in the higher capital requirement. Although OFHEO intends to run additional scenarios in order to monitor an Enterprise's capital adequacy, OFHEO does not need to modify the regulation to include scenarios beyond those specifically required in the 1992 Act. Moreover, it is not clear that specifying additional scenarios in the risk-based capital regulation would address the concerns of the commenters. If OFHEO were to add scenarios to the final rule, an Enterprise could simply enter into additional derivatives contracts that would hedge the new scenarios.

The 1992 Act specifies two interest rate scenarios, but it does not prohibit the running of additional scenarios as part of OFHEO's on-going monitoring of safety and soundness of the Enterprises. OFHEO can only test how well the results of the statutory scenarios reflect risk if OFHEO continues to run additional scenarios based on market conditions and other factors the Director considers appropriate. Should OFHEO discover any capital weakness when it runs additional scenarios, OFHEO has supervisory tools available to correct the situation. For example, if additional stress testing reveals that scenarios equally or less stressful than those in the 1992 Act would cause an Enterprise to fail the stress test, the Director may determine that grounds for discretionary capital reclassification exist under section 1364(b) of the 1992 Act. Similarly, a finding by the Director that an Enterprise is conducting itself in a way that threatens to cause a significant depletion of core capital would provide grounds for a cease and desist order.

B. Operational Workability of the Regulation

A broad theme of the comments was that OFHEO should move expeditiously to a final rule that is operationally workable. By operationally workable, most commenters meant that the regulation must provide for accurate and timely calculations of risk-based capital requirements. From a regulatory perspective, OFHEO agrees, because the risk-based capital requirement, together with the minimum capital requirement, serves as the basis for classifying the Enterprises as ''adequately capitalized'' or ''undercapitalized.'' OFHEO must determine these classifications as quickly as possible to minimize delays in identifying capital shortfalls. However, a number of commenters also expressed more specific concerns related to how the rule and the stress test that underlies it will operate in practice. These comments and OFHEO's responses to them are explained below.

1. Replicability and Transparency

To the Enterprises and some other commenters, the concept of operational workability meant that the stress test should be sufficiently transparent that the Enterprises can use it for internal planning and analysis. This level of transparency would allow the Enterprises to calculate capital numbers on their own systems with reasonable assurance that the results will closely mirror OFHEO's results. To certain non-Enterprise commenters, however, the concept of transparency meant complete replicability of OFHEO's results—that is, the ability of parties other than OFHEO and the Enterprises to run the stress test and to evaluate the potential impacts on Enterprise regulatory capital requirements of changes in the economy or Enterprise business mix. These commenters asserted that in order to promote market discipline, the stress test should be this transparent to third parties. They recommended that OFHEO release the computer code as well as the complete specifications of the stress test. A few commenters stated that the stress test could not be completely transparent without the release of Enterprise data, some of which may be proprietary.

OFHEO strongly supports a concept of operational workability that allows capital classifications to be determined in a timely manner, allows the Enterprises to use the stress test as a planning tool, is transparent to third parties, and allows capital classifications to be calculated in a timely manner. To this end, OFHEO, working with the Enterprises, has developed a standardized reporting format, the RBC Report, that will permit the reported data to be input into the stress test without manipulation and will work with the Enterprises to assist them in aligning their data systems with the reporting format so that they will be able to run the stress test on their systems and achieve the same result as the Director. This will permit timely classifications and will permit the Enterprises to anticipate what their capital classification will be. OFHEO's treatment of new activities, discussed below in III.B.3., New Enterprise Activities, is also designed to allow the Enterprises to understand the probable impact of new activities on their regulatory capital requirements. In addition, OFHEO will release to the Enterprises and other requesting parties a copy of the computer code. A stylized data set also will be made available to interested parties to permit them to understand the sensitivities and implications of the stress test.[43] This information will allow parties other than OFHEO to apply the stress test to any set of starting data in the same manner as OFHEO.

OFHEO disagrees, however, with commenters who suggest that third parties should be provided the actual starting position data that are input to the stress test. These data include Enterprise information that is not public and may be subject to legal prohibitions or restrictions on disclosure or may otherwise unfairly disadvantage an Enterprise if disclosed. Given the statutory protections for proprietary data included in the 1992 Act and elsewhere,[44] OFHEO believes that the requirement of the 1992 Act that others be able to apply the test in the same manner as the Director should not be read to require the release of proprietary data. OFHEO anticipates that the information it is supplying to the public about the model meets this statutory requirement and provides interested parties with a solid understanding of the interaction in the model of credit and interest rate stresses and an ability to understand the capital implications of changes in an Enterprise's risk profile. OFHEO strongly favors promoting market discipline. Because of the forward-looking nature of the stress test, OFHEO's periodic publication of the current capital numbers together with current capital classifications will promote such discipline.

2. Predictability v. Flexibility

The comments suggest that in order for the stress test to be useful to the Enterprises in their businesses, its results must be sufficiently predictable to permit it to be used as a planning tool, while sufficiently flexible to take into account new products or other innovations by the Enterprises. From these somewhat competing considerations flowed a range of comments concerning the frequency with which OFHEO should amend the

[43] The stylized data set will include a realistic mix of on- and off-balance sheet items of a hypothetical Enterprise. It will allow any interested party to run the test, to vary the mix of items, add or delete items, change starting interest rates, modify historical house price patterns, and understand potential impacts of these actions or events upon Enterprise capital.

[44] *See, e.g.,* 12 U.S.C. 4611(e)(3); 18 U.S.C. 1905.

regulation, the process that would be followed for changing the regulation, and the treatment of new activities and instruments, i.e., those for which the stress test does not currently prescribe a treatment.

Some commenters suggested that the final rule specify a process for routine updating of the stress test to incorporate industry improvements in risk management techniques. One commenter recommended specifying a threshold, expressed as a percentage of the minimum capital requirement, that would determine when changes require notice and comment. For changes that would not reach the threshold, the commenter recommended specifying a one-year implementation period and for changes that are proposed for notice and comment, a two-year period. Other commenters, including Fannie Mae, recommended severely limiting changes to create ''stability'' in the stress test. Freddie Mac recommended that OFHEO affirm that it would follow the Administrative Procedure Act (APA) when changes are made to the final regulation.

The final rule balances the concern for stability with the concern for flexibility, recognizing that the nature of the Congressional mandate and the dynamic nature of the Enterprises' businesses will require an ongoing assessment of how well the stress test achieves its objectives. To achieve its statutory objective of aligning capital to risk, the stress test necessarily must evolve as the risk characteristics of new and complex instruments and activities become better understood and modeling techniques more highly developed. Therefore, OFHEO cannot eliminate uncertainty about how the stress test might evolve without reducing the sensitivity of the stress test to risk. Sufficient discretion must be retained by the Director to respond to innovations as they occur. And yet, in its important particulars, there must be enough stability in the stress test to allow the Enterprises and others to predict with reasonable confidence the impact that changes in their business plans or the economy may have on their capital requirements.

OFHEO will continue to monitor and study changes in the Enterprises' businesses and the markets in which they operate. OFHEO also will evaluate new statistical data that become available to determine whether they have implications for Enterprise risks. These continuing efforts will, doubtlessly, suggest reestimation of the models and other changes to the stress test from time to time. However, OFHEO does not find it appropriate at this time to specify a process, beyond the APA, for routine updating of the rule or to commit in advance to limiting the size or frequency of changes to the rule. Only after the rule has been operational for a significant period of time can OFHEO assess whether there is a need for further rulemaking to specify a change process. In any event, OFHEO affirms that any future amendments to the regulation will comply with the APA.

3. New Enterprise Activities

a. Proposed Rule

Section 1750.21 of the proposed regulation and section 3.11 of the Proposed Regulation Appendix together were designed to implement the substantive risk-based capital requirements of the 1992 Act,[45] the notice and comment requirements of the APA,[46] and the replicability and public availability requirements of sections 1361(e) and (f) of the 1992 Act.[47] The quarterly capital calculations required by the 1992 Act[48] must, as accurately and completely as possible, capture the risks in the portfolio of each Enterprise. The requirement that classifications be done on not less than a quarterly basis is designed to ensure that changes in the risk profile of an Enterprise are captured frequently and reasonably close in time to when they are reflected on an Enterprise's books.

Given the dynamics of the marketplace and the Enterprises' business, it is not possible to construct a regulation that specifies a detailed model that could predict every new type of instrument or capture every new type of risk that might emerge from quarter to quarter. Therefore, to comply with the requirements of the 1992 Act, the proposed regulation included a provision, section 3.11 of the proposed Regulation Appendix, to address future instruments and activities, thus enabling each quarterly capital classification to be as accurate as possible. Section 3.11, together with other provisions in the regulation, was intended to help achieve that accuracy.

More specifically, section 3.11 of the proposed Regulation Appendix provided that the credit and interest rate risk of new activities and instruments would be reflected in the stress test by simulating their credit and cash flow characteristics using approaches already described in the Appendix. To the extent those approaches were not applicable directly, OFHEO proposed to combine and adapt them in an appropriate manner to capture the risk in the instruments. Where there is no reasonable approach using combinations or adaptations of existing approaches, the proposed stress test would employ an appropriately conservative treatment, which would continue until such time as additional information is available that would warrant a change to the treatment.

In addition to the substantive provisions of section 3.11 of the proposed Regulation Appendix, procedures were proposed in that section and in section 1750.21 of the regulation that would give the Enterprise involved advance notice of the treatment to be implemented and an opportunity to comment on it before it is implemented. Procedurally, proposed section 3.11 provided that an Enterprise should notify OFHEO of any pending proposal related to new products, investments, or instruments before they are purchased or sold or as soon thereafter as possible. The procedures in the proposed rule were also intended to encourage the Enterprise to provide OFHEO with any suggestions it may have as to an appropriate risk-based capital treatment for the activity or instrument. With the benefit of the information provided by the Enterprise, OFHEO would then notify the Enterprise of its estimate of the capital treatment as soon as possible.

Beyond these provisions, proposed section 1750.21 provided that the Enterprise would be notified of the proposed treatment when OFHEO provided the quarterly Notice of Proposed Capital Classification. After receiving that notice, the Enterprise would have thirty days to provide further comments to OFHEO. Those comments would be considered by OFHEO prior to issuing the final capital classification. Further, to ensure that the rest of the public could apply the test in the same manner as the Director, OFHEO planned to make the new treatment available to the public through an appropriate medium, such as the **Federal Register**, OFHEO's website, or otherwise. Comments from the public on these notices would be considered by OFHEO. Taken together, all of these provisions implement the procedural provisions of the 1992 Act and the APA, while assuring that the timely, complete and accurate capital classifications required by the 1992 Act are carried out.

b. Comments

Numerous comments addressed the capital treatment of new activities proposed in section 3.11 of the Regulation Appendix in NPR2. These

[45] 12 U.S.C. 4614, 4618.

[46] 5 U.S.C. 553.

[47] 12 U.S.C. 4611(e), (f).

[48] 12 U.S.C. 4614(c).

comments all urged OFHEO to adopt a clearly understood procedure that would be sufficiently flexible to allow the Enterprises to continue introducing new products. They emphasized that delay and uncertainty about treatments of new activities could frustrate introduction of innovative new products and business lines at the Enterprises.

The Enterprises both recommended that the process for new activities should allow them to understand as soon as possible the effect on capital of any new types of products or instruments that they introduce. Both Enterprises offered suggestions in the context of their recommendation that the stress test be run using their own infrastructures.[49] Although these suggestions differed in their details, both would allow the Enterprises to develop and implement capital treatments for new activities, subject to subsequent review and change by OFHEO.

Other commenters suggested that if OFHEO determined that a proposed treatment for a particular new activity would have a minimal impact upon total risk-based capital, that the treatment should be expedited and that no notice and comment process should be required. Treatments that would have a substantial impact on capital would be implemented using notice and comment procedures under the APA. One commenter suggested that a risk-based capital ''surcharge'' be applied ''on top of the normal capital requirements'' to account for any new activities until sufficient data could be compiled to determine the risk inherent in such activities. Another commenter recommended three modifications to the treatment of new activities in the NPR: first, that OFHEO use historical data from reliable sources and confer with bank regulators to determine the most appropriate treatments; second, that OFHEO use a transparent comment process, including review by a technical advisory board that would allow input on treatments of new activities from all interested market participants; and third, that the treatments for new activities should be incorporated timely into the stress test.

c. OFHEO's Response

The Enterprises' recommended approaches, in which they would implement capital treatments subject to subsequent OFHEO review, are not practicable within the framework of the final rule because OFHEO will run the stress test using its own computers and its own infrastructure. Nevertheless, OFHEO recognizes the importance of making timely decisions about the capital treatments for new activities. Before the risk-based capital amount of the affected Enterprise for a particular quarter can be calculated, those decisions must be made about all new activities introduced during that quarter. Accordingly, OFHEO has developed a process to make its own independent and informed determination of the appropriate capital treatment for new activities as early as possible, with input from the Enterprises, rather than relying upon their judgments for the first quarterly capital classification after a new activity reported in the RBC Report. OFHEO believes that this process (discussed below) will not impede the development or introduction of new products or other types of business innovation.

As discussed above, OFHEO received various recommendations regarding the appropriate notice and comment procedures for new activities. OFHEO has fully utilized notice and comment procedures, discussed at IC., Rulemaking Chronology, in promulgating this regulation and OFHEO included procedures in NPR2 that will provide ongoing notice and comment for treatments of new activities. In addition, the final rule modifies NPR2 to clarify that the Enterprises are encouraged to provide their recommendations regarding treatments of their new activities and that the broader public will be notified of treatments once they are included in a final capital classification. The public is encouraged to submit their views regarding such treatments, which will be considered by OFHEO on an ongoing basis.

OFHEO believes that public input in the development of rules is essential for sound and fair regulation of the Enterprises. At the same time, to comply with the 1992 Act, OFHEO needed to establish procedures for new activities that would permit the accurate and timely capital classifications required by the 1992 Act. Accordingly, the regulation provides for notice to the affected Enterprise and the public and for consideration of comments received, while it also ensures the ability of OFHEO to conduct continuous, timely and complete capital calculations.

As time passes and a significant volume of new activities has been addressed through the section 3.11 New Activities process, it may be appropriate to propose an amendment to the regulation, utilizing the notice and comment procedures of 5 U.S.C. 553, that would specify treatments for a group of new activities. Although the public will have had the opportunity to provide comments on individual activities on an ongoing basis, this additional process would enable OFHEO to benefit from supplementary comments that are framed in the context of a broader body of risks.

In response to the recommendation regarding an external technical advisory board, OFHEO does not consider it appropriate to require by rule that such a board review the treatment of all new activities. OFHEO is satisfied that the wide diversity of technical expertise of its staff, combined with the normal notice and comment process, will generally provide adequate analysis and review of new activities.

As to the comment suggesting a capital ''surcharge'' for new activities on top of the ''regular'' risk-based capital requirement, OFHEO believes that its approach to new activities is appropriately flexible to take into account the risks inherent in any new, untested activity. OFHEO anticipates that it will be able to model effectively many (if not most) new activities explicitly according to their terms or with combinations or adaptations of existing treatments. Where the risk of a new asset type cannot be captured adequately using specified treatments or combinations or adaptations of treatments, OFHEO may use an appropriately conservative fixed capital charge instead of or in addition to an existing modeling treatment. However, in a cash flow model (in contrast to a leverage ratio approach), a fixed capital charge may not be the best method to implement a conservative capital treatment for most instruments. In particular, applying a fixed capital charge for liabilities or for activities that are designed to reduce risk is rarely appropriate.

A more appropriate means of increasing the incremental capital associated with a particular asset in a cash flow model may be to apply a ''haircut'' to the cash flows from that asset, either directly or by otherwise specifying certain attributes that are relevant to the cash flows of these instruments.[50] A similar approach can be applied to instruments, such as derivative or insurance contracts that are designed to reduce risk. To the extent that a liability can not be modeled according to its terms, the appropriate approach is generally to

[49] *See* III.A.2., Proprietary/Internal Models.

[50] For example, requiring certain interest-bearing assets that are on the balance sheet to pay no earnings through the stress period could be an extremely conservative treatment, because the liabilities necessary to fund that asset would be paying interest throughout the stress period.

incorporate certain conservative assumptions about the amount of cash flow that will be required from the Enterprise.[51] For these reasons, OFHEO believes that the flexibility afforded by section 3.11 is preferable to the imposition of a surcharge for new activities.

In sum, the OFHEO has not altered its proposed approach to new activities, but, based upon the comments, determined that some clarification of that approach in the final regulation would be useful. Therefore, the final rule adopts § 1750.12 of the proposed regulation and section 3.11 of the proposed Regulation Appendix with some modifications. The revised definition of new activities in section 3.11.1.b of the Regulation Appendix clarifies that the section applies not only to new transactions and instruments, the most common new activities, but also other types of new activities. The term ''new activities'' is, therefore, defined broadly to include any asset, liability, off-balance-sheet item, accounting entry, or activity for which a stress test treatment has not previously been applied. This definition would include any such items that are similar to existing items, but that have risk characteristics that cannot be taken into account adequately with existing treatments. The definition further clarifies that an instrument or activity may be treated as a ''new activity'' if it increases in volume to such an extent, or if new information indicates, that an existing treatment does not account adequately for its risk.

In section 3.11.2.a, which replaces proposed section 3.11(c), the words ''are expected to'' have been replaced with the word ''shall'' and the phrase ''no later than in connection with submission of the RBC Report provided for in § 1750.12'' has been replaced with the phrase ''within 5 calendar days after the date on which the transaction closes or is settled.'' This requirement is also reflected in the regulation text at § 1750.12(c) in the final regulation. These changes are designed to address concerns that appropriate capital treatments of new products be determined as quickly as possible. Timely determinations of capital classifications and required capital amounts provide an early warning of a potential strain on an Enterprise's capital. They also serve the interests of many commenters who felt that delay and uncertainty about capital treatments of new activities could impede innovation at the Enterprises.

OFHEO anticipates that, ordinarily, the Enterprises will notify OFHEO of significant new activities well in advance of entering into the actual transactions and will provide draft documentation, anticipated cash flow analysis, and recommended capital treatments as that information is developed for the Enterprises' internal decision-making. For new activities that do not involve transactions, such as an accounting change, OFHEO anticipates that relevant information will be made available well before actual implementation of the new activity. This type of coordination will allow OFHEO to develop initial capital treatments at the same time that an Enterprise is incorporating the new instruments into its own internal models, reducing uncertainty about the capital impact of new activities and allowing the new treatments to be implemented quickly enough to facilitate timely capital calculation and classification. OFHEO anticipates that the Enterprises will incorporate into their internal systems and procedures for product development the process of obtaining the views of OFHEO as to the appropriate capital treatment of each new activity. However, OFHEO realizes that it might not always be possible for the Enterprises to provide notification to OFHEO of a new activity well before submission of the quarterly RBC Report. As with any federally-regulated financial institution, if an Enterprise were to market a new instrument or engage in some new business activity without coordinating with its regulator to determine, in advance, an appropriate initial capital treatment, that initial treatment would necessarily be conservative—that is, it would ensure, in the absence of complete information, that sufficient capital is set aside to offset any risks that may be associated with the new instrument or activity.

Section 3.11 as proposed in NPR2 has also been changed to include three new provisions that expressly state OFHEO's intentions in the implementation of this section. First, section 3.11.2.a encourages an Enterprise that is in the process of or has engaged in a new activity to provide OFHEO with its recommendations regarding the treatment of that activity when it first provides information regarding the activity to OFHEO. Any recommendations will be considered by OFHEO in developing the proposed capital classification. The Enterprise will have the opportunity to comment on that treatment in connection with its other comments on the proposed capital classification.

Second, section 3.11.3.d provides that after a treatment has been incorporated into a final capital classification, OFHEO will provide notice to the other Enterprise and the broader public of that treatment. OFHEO will consider any comments it receives from those parties regarding such treatment during subsequent quarters.

Finally, section 3.11.2.b provides that the stress test will not give an Enterprise the benefit associated with a new activity where the impact of that activity on the risk-based capital level is not commensurate with its economic benefit to the Enterprise. Although it is not expected that the Enterprises would want to deal in transactions or instruments that do not have legitimate business purposes, OFHEO must retain the authority to exclude such instruments from risk-based capital calculations should they occur.

4. Standardized Reporting

The Enterprises suggested that OFHEO specify a standardized RBC Report. Such specifications would include sufficiently detailed instructions to allow the Enterprises to aggregate the data in a format that can be input directly into the stress test. OFHEO agreed with this suggestion and has developed such a report. The report will shorten considerably the time needed to produce the risk-based capital requirements. It will also provide the Enterprises with more certainty in performing their own risk-based capital calculations.[52]

5. Capital Classification Process

a. Comments

The Enterprises requested that the regulation describe a practical and timely process for reporting risk-based capital and determining capital classifications. A number of specific suggestions were made. First, they both recommended that they would report stress test results quarterly along with the data used to run the stress test and OFHEO would then determine quarterly capital classifications based on the Enterprises' calculations. Freddie Mac also recommended that OFHEO classify an Enterprise as adequately capitalized if it meets the minimum capital requirement and quickly remedies a failure to meet the risk-based capital requirement before the classification is reported. Freddie Mac further recommended that OFHEO retain the discretion to specify when the quarterly

[51] If, for example, the amount of interest on a note was indexed to a volatile indicator that could not be modeled in the stress test, a conservative treatment might be to require that instrument to pay interest throughout the stress period at a rate significantly higher than the average return of the Enterprise on its assets during that period.

[52] *See* II.B., Data.

capital reports are due rather than specifying that they must be filed within 30 days of the end of the quarter. Finally, Freddie Mac recommended that the regulation require an Enterprise to amend a capital report only if a data input revision might result in a capital reclassification.

b. OFHEO Response

As noted above, OFHEO will run the stress test and determine capital classifications using its own systems using data reported by the Enterprises in a standardized format. The Enterprises may duplicate OFHEO's stress test calculations by running the stress test in the same manner as OFHEO. If an Enterprise believes there are discrepancies, it may comment on them during the 30-day response period following OFHEO's notice of proposed capital classification.

OFHEO did not adopt Freddie Mac's suggestion that the Enterprises be given an opportunity to remedy capital shortfalls before the capital classification is reported. Since the risk-based capital requirement is based on data submitted by the Enterprises as of a particular point in time, it is appropriate to determine whether an institution meets the standard as of that date for classification purposes. Although the classification could be accompanied by a description of any remedial actions an Enterprise has taken since the reporting date, it would not be possible to know with certainty that the remedial action brought the Enterprise into compliance with its risk-based capital standard without running the stress test again with new starting position data on its entire book of business.

The final regulation does not change the requirement that the RBC Report be filed within 30 days of the end of the quarter. OFHEO believes the RBC Report should be filed as promptly as possible after the end of quarter so that the capital classification can be determined promptly, and, in any event, within the same 30 days required for the minimum capital report. OFHEO recognizes that, initially, Enterprise preparation of the RBC Report will require more time and effort than is needed for the minimum capital report. Therefore, during the one year period following promulgation of the final rule, OFHEO will consider requests for an extension on a case-by-case basis.

OFHEO has determined that an amended RBC Report should be filed whenever there are errors or omissions in a report previously filed and not, as Freddie Mac suggested, only when the change would result in a different capital classification. In OFHEO's view, prudent monitoring of risk-based capital requires the reporting of all changes. The rule makes clear that the Enterprise is obligated to notify OFHEO immediately upon discovery of such errors or omissions and file an amended RBC Report within three days thereafter. In addition, the final rule clarifies that if there is an amended report, the computation of the risk-based capital level will still be based on the original report unless the Director, in his/her sole discretion, determines that the amended report will be used.

The final rule also requires the board of directors of an Enterprise to designate the officer who is responsible for overseeing the capital adequacy of the Enterprise as the officer who must certify the accuracy and completeness of the RBC Report.

NPR2 proposed to delete existing section 1750.5, which sets forth the capital classification procedure under the minimum capital rule, and replace it with a new subpart that would govern capital classification under both the minimum and risk-based capital rules. Subsequent to the publication of NPR2, OFHEO published a notice of proposed rulemaking entitled Prompt Supervisory Response and Corrective Action,[53] which includes a more comprehensive proposal related to capital classification than NPR2. Because OFHEO anticipates that the Prompt Supervisory Response and Corrective Action rule will be adopted prior to the first classification of the Enterprises under the risk-based capital rule, existing section 1750.5 is not deleted and proposed subpart C is not adopted in this final rule.

6. Interaction With Charter Act Provisions

Freddie Mac requested that OFHEO clarify the interaction of this risk-based capital regulation with the capital distribution provisions of Enterprises' respective Charter Acts during the one-year period following the effective date of the regulation. The Charter Act provisions are already in effect and have been since enactment of the 1992 Act.

During the one-year period after promulgation of the final rule, OFHEO will take into consideration the need for the Enterprises to adjust to the new rule, and will exercise its authority under the Charter Act provisions in a manner appropriate to the circumstances and consistent with OFHEO's intent to provide the Enterprises a one-year transition period to adjust to the risk-based capital requirement. During such period, there would be no impact on an Enterprise's ability to make capital distributions absent adequate prior notice to the Enterprise of its capital position and adequate opportunity to take reasonable and prudent steps to address any articulated deficiency.

7. Implementation

OFHEO has taken appropriate proactive measures to ensure a smooth implementation of the risk-based capital (RBC) rule and the computer code that implements the rule. These measures, which include independent verification and testing of the code, minimize the likelihood of unforeseen technical or operational issues. However, should any such issues arise, OFHEO has ample and flexible authority, which it will utilize to resolve them quickly.

a. Computer Code Enhancements

After publication of the RBC rule, OFHEO will make available to requesting parties the computer code that implements the technical specifications of the rule and a dataset representative of the Enterprises' businesses. OFHEO encourages feedback on the operation of the code by parties who utilize it, including suggestions for more efficient ways to code the technical specifications of the rule.

The computer code that implements the RBC rule will necessarily evolve over time as the businesses of the Enterprises evolve and as OFHEO builds efficiencies into the code to enhance its operation and utility. Also, as the Enterprises seek to adapt their systems to run the stress test internally, they may suggest alternative methods of coding the technical specifications of the rule that would enable them to compile their data submissions more quickly or produce results more efficiently. OFHEO will consider adopting a suggested change in the code provided it accurately reflects the computational instructions of the rule and can be applied accurately and fairly to both Enterprises. OFHEO will develop a process for the receipt, review, and disposition of suggested changes to the code.

In addition, OFHEO has the authority to make any changes it deems necessary to the code at any time, without notice and comment, as long as those changes are not inconsistent with the technical specification of the RBC rule. This authority allows OFHEO to address any technical or other problems that might arise in the operation of the code on a timely basis. Any changes to the code will be made available to the public.

[53] 66 FR 18694 (April 10, 2001).

b. RBC Rule Revisions

OFHEO will consider over time the need for formal amendments to the RBC rule after its effective date. If at any time after the effective date a need arises to amend the rule on an urgent basis, OFHEO has ample authority under the 1992 Act [54] to make such changes on a timely basis consistent with the APA. The Senate Report accompanying the 1992 Act makes it clear that Congress recognized that the stress test must necessarily evolve as the Enterprises' businesses evolve and contemplated that a variety of procedural options for quick action would be necessary to keep current the risk-based capital regulation. In regard to the risk-based capital regulation, the Report states that ''[t]he regulations must be sufficiently detailed to allow others to comment meaningfully on them and approximate closely their effects.'' It goes on to emphasize that ''[o]rders or guidelines may be used for some of the finer details to permit flexibility to make small changes on a rapid basis when necessary.'' [55]

The APA provides a variety of procedural options that would be available to remedy technical problems in the RBC rule, whether they are minor or significant. First, the Director may act quickly, without notice and comment, to make technical corrections, clarifications, or interpretations of the rule. This authority would permit most technical and operational problems to be remedied expeditiously. The Director would publish the correction, clarification, or interpretation of the rule in the **Federal Register** and make revisions to the code available. Second, should a more substantive change to the technical specifications be required, the Director may separately issue a direct final rule or a final rule on an interim basis with request for comment, either of which would take effect immediately. Third, the Director, in a separate rulemaking with a relatively short comment period, may propose amendments to the risk-based capital regulation and move quickly to a final rule amending the risk-based capital regulation. These and other administrative tools are available to address any technical or operational problems that may arise in the implementation of the rule.

C. Implications

OFHEO received extensive comments about the implications of the proposed risk-based capital rule from the Enterprises, financial service organizations, trade associations, and affordable housing advocacy groups. The commenters focused on three primary issues: (1) Whether the risk-based capital rule properly aligns required capital to economic risk, (2) whether the rule would increase the cost of home ownership generally; and (3) whether the rule would result in the Enterprises reducing their support for affordable housing. There was a diversity of opinion on these issues. Commenters also provided many specific recommendations with respect to the implications of the risk-based capital rule. OFHEO has responded to these recommendations under the specific topics to which they relate.

1. Aligning Capital to Economic Risk

The commenters generally agreed that a stress test is an appropriate method to align capital to risk. Nevertheless, some commenters, including the Enterprises, investment firms, and some trade associations, stated that OFHEO needs to improve the alignment of capital to economic risk and offered specific suggestions to accomplish this, which are discussed under the specific topics to which they relate. These commenters claimed that failure to align capital to economic risk may reduce the availability of certain products, create disincentives to risk sharing and risk reduction, and result in price distortions.

OFHEO continues to believe that the significant stresses that the regulation applies to the Enterprises' books of business are appropriate for determining the risk-based capital requirement and to align required capital closely to the economic risk. Nevertheless, many of the modifications to the regulation made by OFHEO align capital more closely to the economic risk, based in part on specific suggestions offered during the rulemaking process. These modifications are also discussed under the specific topics to which they relate. As a result of these changes, OFHEO believes that the final risk-based capital rule provides an even better mechanism for closely aligning regulatory capital to economic risk than the proposed rule.

OFHEO is charged with ensuring the continued viability of the regulated entities so that they can continue to carry out their important public purposes, including promoting affordable housing and a stable and liquid secondary mortgage market. As a financial regulator, OFHEO may have a different perspective on the types of risks that must be capitalized and the appropriate corresponding capital levels than the financial institutions it regulates. Prudent risk managers generally respond to increased risk by either increasing their capital in line with the increase in risk or by taking steps to reduce or hedge risk. Publicly traded companies, such as the Enterprises, will always be under pressure to obtain a competitive return on equity for their shareholders and to maintain a significant level of capital distributions. OFHEO's risk-based capital regulation provides a strong incentive for the Enterprises to resist excessive shareholder pressure for short-term returns and essentially requires the Enterprises to exercise the kind of prudent risk management that will ensure that they have sufficient capital to protect them in times of economic stress and volatility.

2. Effect on Home Ownership Generally

a. Comments

Commenters voiced significant disagreement about whether the risk-based capital rule would increase mortgage rates and the cost of home ownership generally. The Enterprises, Wall Street investment firms, and some trade groups expressed concern that the proposed regulation would require an Enterprise to hold what they termed an ''unreasonable'' amount of capital. These commenters asserted that requiring an ''unreasonable'' amount of additional capital would increase mortgage interest rates and thus decrease the affordability of a mortgage and the availability of funding for home purchases.

Other financial services organizations, including GE Capital, AIG, and CMC argued that higher capital requirements do not necessarily translate into higher mortgage interest rates. They noted that the Enterprises have several options other than passing along the cost of higher capital to lenders and ultimately home buyers. For instance, these commenters stated that the Enterprises could issue additional equity, take on less risk, or implement various risk mitigation activities. These commenters further noted that critics of the risk-based capital proposal focused only on the negatives, while ignoring the benefits of an effective risk-based capital standard, particularly the significant benefit of decreasing the risk of failure of the Enterprises. One commenter stated that OFHEO should err on the side of requiring more capital rather than less, given the Enterprises' size and importance to the U.S. economy.

b. OFHEO's Response

After a review and analysis of the comments, OFHEO concluded that the risk-based capital regulation, as

[54] 12 U.S.C. 4513, 4526, 4611.

[55] S. Rep. No. 102–262 (1992), p. 23.

modified, properly implements Congress' desire for the Enterprises to hold an appropriate level of capital to minimize the risk of failure of the Enterprises, increasing the likelihood that the Enterprises can continue to carry out their important public purposes. The significant credit and interest rate stresses mandated by the 1992 Act are designed to produce a capital requirement that encourages the Enterprises to manage risk appropriately and that results in a capital requirement that adequately reflects risk.

OFHEO does not agree that the rule would necessarily or even likely result in higher mortgage rates that would ultimately be passed along to consumers. First, OFHEO believes that the Enterprises will be able to meet the requirements of the regulation at relatively little or no cost, as discussed in NPR2.[56] Moreover, prices are not tightly tied to costs in any event. Second, because the Enterprises are subject to a stringent capital regulation, the financial markets may perceive that the Enterprises are less risky. Such a market assessment would likely be reflected in the pricing of the Enterprises' debt and equity, especially subordinated debt, which is particularly market sensitive. Third, even if the risk-based capital regulation were to have some minor effect on one Enterprise's cost of lending and that Enterprise attempted alone to pass this cost along through higher guarantee fees, that Enterprise would risk losing market share.

As noted by several commenters, an Enterprise has numerous cost-effective methods to offset any additional risk-based capital requirements and may adjust to the standard in ways that do not necessarily result in increased mortgage rates. OFHEO agrees with this observation and notes that an Enterprise has several options to accomplish this task. For instance, financial markets provide a wide array of sophisticated ways to manage interest rate risk, including callable long-term debt, caps and floors, swaps and swaptions, and interest rate derivative contracts. In addition, an Enterprise could reduce credit and interest rate risk by reducing the rate of growth of its asset portfolio, increasing the credit protection on riskier assets that it guarantees or holds in portfolio, or reducing the rate of growth of its mortgage guarantee business. An Enterprise may also respond to increased capital requirements by increasing capital by reducing share repurchases, adjusting dividends, or issuing new equity shares.

OFHEO therefore concludes that an Enterprise has broad latitude to select the method or methods to manage its risks and comply with the risk-based capital requirement without increasing mortgage rates. These various strategies will have different direct costs, but may well result in fewer credit and interest rate losses over time.

3. Effect on Affordable Housing

a. Comments

A number of commenters voiced significant disagreement about whether the risk-based capital rule would impair the Enterprises' efforts to promote the availability of mortgage funds to support affordable housing for low- and moderate-income Americans. The Enterprises, affordable housing advocacy groups, and some trade associations and financial firms expressed concern that the rule may cause the Enterprises to decrease the availability of funds used to purchase affordable housing. These commenters believed that the rule could impair the Enterprises' ability to serve low-income borrowers and hinder the financing of multifamily and rental properties. One commenter stated that the Enterprises should be awarded capital bonuses for engaging in affordable housing activities.

In contrast, other financial service organizations stated that there is no ''automatic'' conflict between having rigorous capital standards for the Enterprises and increasing the supply of funds for affordable housing. These commenters noted that HUD, not OFHEO, should address affordable housing issues through its affordable housing regulations.

b. OFHEO's Response

OFHEO continues to believe that the risk-based capital standard will not have a noticeable adverse affect on the Enterprises' ability to purchase affordable housing loans, particularly with respect to single family loans. OFHEO notes that the Enterprises obtain similar profitability from their affordable housing loans as their general loan portfolio. As OFHEO noted in NPR2,[57] the capital cost of single family loans meeting HUD's affordable housing goals is not materially different from the cost of other loans for equivalent loan-to-value (LTV) ratios. Although the stress test distinguishes among loans based on LTV ratios, it makes no specific distinctions with respect to loans to different income groups. Moreover, OFHEO has modified the single family model to calibrate defaults to the benchmark loss experience by LTV category, which should alleviate some of the commenters' concerns about the treatment of high LTV loans. *See* III.I.1., Single Family Mortgage Defaults and Prepayments. OFHEO further notes that the Enterprises' affordable housing programs are currently well run, and the Enterprises effectively mitigate increased risks associated with high LTV loans with credit enhancements. In addition, the final rule modifies the treatment of low-income housing tax credits, which some commenters considered to be punitive. *See* III.N., Accounting, Taxes, and Operating Expenses.

OFHEO disagrees with the comment that OFHEO should award capital bonuses to an Enterprise for engaging in affordable housing activities. OFHEO agrees with those commenters who stated that HUD's affordable housing regulations are the appropriate method for ensuring that sufficient attention is given to affordable housing. The purpose of the risk-based capital regulation is to ensure that the Enterprises' capital is properly aligned with risk. Even if the risk-based capital standard required additional capital related to a portion of the Enterprises' affordable housing activities, such a requirement would be consistent with ensuring that the Enterprises hold sufficient capital for the risks they take. Failure to align capital with the credit risk of particular loan programs could result in curtailment or cessation of those programs. Freddie Mac's early experience with multifamily loans is a case in point. Losses on that program caused Freddie Mac to cease multifamily lending altogether in the early 1990s.

D. Benchmark Loss Experience

In NPR1, OFHEO proposed the methodology to identify the contiguous areas containing five percent or more of the U.S. population that experience the highest rate of default and severity of mortgage losses for a time period of two or more years as required by the 1992 Act.[58] Losses experienced by loans in the identified time and place are referred to as the ''benchmark loss experience.'' The credit stress of the stress test must be reasonably related to the benchmark loss experience.

The proposed methodology involves four steps. The first step is to identify the benchmark loss experience using historical loan-level data submitted by each Enterprise. The analysis is based on currently available data of conventional, 30-year fixed-rate loans

[56] 64 FR 18114, April 13, 1999.

[57] 64 FR 18116, April 13, 1999.

[58] 12 U.S.C. 4611(a)(1).

secured by first liens on single-unit, owner-occupied, detached properties. The data include only loans that were purchased by an Enterprise within 12 months after loan origination and loans for which the Enterprise has no recourse to the lender. The second step is to organize the data from each Enterprise to create two consistent data sets. During this process, OFHEO separately analyzes default and severity data from each Enterprise. The third step is to calculate for each Enterprise the cumulative 10-year default rates and severity rates for each combination of States and origination years (State/year combination) by grouping all of the Enterprise's loans originated in that combination of States and years. In this step, hundreds of State/year combinations are calculated and analyzed. The fourth step is to calculate the ''loss rate'' by multiplying the average default rate for that State/year combination by the average severity rate. The State/year combination fulfilling the population and time requirements with the highest loss rate constitutes the benchmark loss experience. Using this methodology, OFHEO identified loans originated in 1983–1984 in the four State region of Arkansas, Louisiana, Mississippi, and Oklahoma (ALMO) as the current benchmark loss experience (''ALMO benchmark loss experience'').

In NPR2, OFHEO described how the benchmark loss experience would be used in the stress test and, building on the methodology proposed in NPR1, used the benchmark cohort of loans [59] to conduct simulations to demonstrate the sensitivity and implications of the proposed rule. As explained in NPR2, the equations used in the mortgage performance models are estimated based upon OFHEO's historical database of mortgage information to predict the most likely default and severity rates for any given group of mortgages under any given pattern of interest rates and house prices.[60] NPR2 also proposed methods of reasonably relating the credit stress of the stress test to the benchmark loss experience.

1. Methodology

Most commenters, including the Enterprises, mortgage insurers, and trade groups, generally stated that the proposed methodology was workable, but suggested changes. A number of commenters, who criticized the benchmark loss experience methodology based on NPR1, were significantly less concerned when they evaluated the issue in the context of NPR2. Freddie Mac concurred generally with OFHEO's methodology to identify the benchmark loss experience and specifically with the selection of the ALMO benchmark loss experience. Nevertheless, as discussed below, Freddie Mac stated that the historical data used to identify the benchmark loss experience should be adjusted or else the benchmark loss experience default and loss severity rates' loss rates would be overstated. Fannie Mae stated that while the methodology for identifying the benchmark loss experience has certain difficulties, such difficulties could be addressed by adjusting the default and severity models. GE Capital stated that because the proposed methodology is reasonable, any changes should wait until the next generation of the model.

Commenters had divergent views on whether the credit conditions identified by the methodology were sufficiently stressful. Some commenters claimed that the proposed methodology does not produce a benchmark loss experience that is stressful enough. These commenters asserted that the proposed methodology identified only a two-year origination period rather than a ten-year period for default and severity rates and that by averaging certain factors (e.g., time and Enterprises' default rates), the methodology resulted in an average rather than a worst case scenario. In contrast, other commenters, including the Enterprises, stated that the benchmark loss experience was more severe than any national experience and more severe than could be expected to occur in a diversified national economy.

The final regulation makes no changes in the proposed methodology for identifying the benchmark loss experience. In evaluating the commenters' suggestions for modifications, OFHEO's first priority was to implement the 1992 Act appropriately. Accordingly, OFHEO determined that it was appropriate under the statute to select the loans originated during a two-year period that had the highest ten-year cumulative default and severity rate (rather than selecting the two-year period that experienced the highest losses on all loans) and to average between the Enterprises. Further, because the purpose is to identify a regional benchmark loss experience and apply it to the nation as a whole, OFHEO did not consider the comments about geographic diversification to be relevant.

OFHEO also sought to balance the benefit of the recommended modifications with the associated costs. With respect to costs, adopting the recommended modifications would divert time and resources from modifications to the stress test in response to comments, delaying the issuance and implementation of the regulation. Based on an analysis of the proposed methodology in light of the related comments, OFHEO has concluded that implementing the commenters' recommendations for revising the methodology would at best provide only modest improvements in identifying a benchmark loss experience, and in some cases would provide little or no benefit. Consequently, OFHEO has decided not to modify the methodology at this time. The proposed methodology provides a reasonable method for identifying the region in which the Enterprises' mortgage loans experienced their worst credit losses.

2. Data Issues

The dataset used to identify the benchmark had certain limitations. Fannie Mae is unable to provide complete historical data for purposes of identifying the benchmark loss experience. Specifically, Fannie Mae has no loss severity data for retained loans originated before 1987 or for loans securitized under its swap program before 1991. In addition, a number of loans were misclassified by Fannie Mae. In NPR1, OFHEO concluded that, for the purpose of the benchmark analysis, it would be better to use the available data, than to speculate about the missing data or otherwise make adjustments to account for the missing or misclassified data.

Both Enterprises expressed concern that without making adjustments to account for the missing data, the benchmark loss experience calculation would overstate the actual default and loss severity rates. They were particularly concerned that these rates would be overstated for the ALMO benchmark loss experience in those years. Accordingly, they recommended that OFHEO introduce weighting and other techniques to adjust for the missing data. With respect to the missing swap program data, Freddie Mac recommended that OFHEO compare mortgages purchased under Fannie Mae's swap program with Freddie Mac's own program, and adjust the default rates accordingly. With respect to missing pre-1987 loss severity data, Freddie Mac recommended that OFHEO adjust the available loss severity data by weighting techniques to

[59] Those conventional 30-year fixed-rate loans in the State/year combination (i.e. loans originated in ALMO in 1983–1984) with the highest loss rate.

[60] *See* 64 FR 18118, April 13, 1999, for a more detailed description.

eliminate what it viewed as bias caused by assuming all loans were 30 year fixed-rate loans. The effect of this adjustment would lower loss severity rates in the benchmark loss experience.

After analyzing the comments, OFHEO has confirmed its original determination that it would be inappropriate to modify or otherwise ''adjust'' for the missing Fannie Mae historical data. It does not appear that Fannie Mae will ever be able to provide this data, and any attempt to adjust existing data based on assumptions about non-existing data would be speculative at best. Accordingly, OFHEO declines to introduce any additional weighting techniques or other assumptions to its initial decision to use the historical data as they exist. OFHEO believes that using the data as submitted by the Enterprises is appropriate, particularly given that the Enterprises' recommendations were based on speculative premises about how historical data would perform rather than empirical or other quantitative evidence.

3. Benchmark Region and Time Period

In NPR1 and NPR2, OFHEO stated that it would periodically monitor available data and reevaluate the benchmark loss experience using the methodology set forth in the Regulation Appendix. OFHEO noted that, using this methodology, it may identify a new benchmark loss experience in the future that has a higher loss rate than the one identified at the time of the regulation's issuance. It further noted that if such a benchmark is identified, OFHEO may incorporate the resulting new benchmark loss experience in the stress test.

Freddie Mac requested that the regulation specify not only the methodology to identify a benchmark loss experience, but also a specific benchmark loss experience, such as the ALMO benchmark loss experience for loans originated in 1983–1984. OFHEO has determined that it is more appropriate to include only the methodology in the regulation. The 1992 Act does not require that OFHEO specify a particular benchmark region and time period in the regulation. Moreover, given Congress' desire for the benchmark loss experience to represent a stressful credit environment, it would be inappropriate to reduce OFHEO's flexibility to identify a different benchmark loss experience if new data indicate that a change is appropriate.

4. Compactness

Freddie Mac suggested adding an additional criterion to the statutory criteria for identifying the benchmark loss experience. Specifically, Freddie Mac recommended that the regulation include what it termed a ''compactness'' requirement so that, in addition to the statutory requirement that the benchmark region comprise ''contiguous'' areas, the benchmark region would have to be a region in which a person could travel from any one State to any other State in the region, without traveling through more than one other State within the region.

OFHEO has determined that modifying the definition of the benchmark loss experience to include an additional compactness requirement is inappropriate and would be unworkable. As discussed in NPR1, OFHEO rejected options that would not provide for a reasonably compact benchmark region. For that reason, the proposed regulation specified States as the smallest geographic unit rather than using smaller geographic units such as zip codes and rejected a definition of ''contiguous'' that would include meeting at a point. It is possible that using smaller units could result in the equivalent of a gerrymandered benchmark loss experience in which it would contain only units with relatively more severe loss experience while excluding regions in the same State with a more benign loss experience. Freddie Mac's recommendation would impose an additional requirement that goes beyond what Congress specified and could preclude identification of an appropriately stressful credit environment. Moreover, the modification recommended by Freddie Mac might be difficult to determine and even unworkable, since there could still be numerous non-compact regions that would comply with Freddie Mac's recommended definition of compactness.

5. Population Requirement

Fannie Mae expressed concern that the ALMO benchmark loss experience may contravene the requirement that the benchmark loss experience contain at least five percent of the United States population, since it believed that the ALMO benchmark loss experience includes States that contribute significant parts of the population but may have few mortgage loans. That Enterprise was also concerned that the ALMO benchmark loss experience may not meet the five percent requirement over the entire stress period.

OFHEO has determined that neither concern is valid. First, the 1992 Act requires that the benchmark loss experience include ''contiguous areas of the United States'' containing at least five percent of the U.S. population. The statutory provision does not address the distribution of loans within that area or specify the designation of a ''State'' as a factor. Accordingly, it is the population of the identified area, not of a State or States within it, that is relevant in determining the benchmark loss experience. Second, the 1992 Act only addresses the population and not the number of mortgage loans. Congress could have specified loan volume as a criterion, but did not, and OFHEO declines to read such a specification into the statute. Third, the 1992 Act does not require that the population requirement be met during the entire stress period for the purpose of determining the benchmark loss experience. The statute only requires the stress conditions to persist for ''two or more years.'' The ALMO benchmark loss experience complies with the statute because it had over five percent of the United States' population in the two year period of 1983 and 1984. OFHEO further notes that a region experiencing significant credit stresses may very well experience a decrease in population. Including the additional limitations suggested by Fannie Mae would reduce the severity of the benchmark loss experience and the stress test as a whole, a result that was not intended by Congress. Based on these considerations, OFHEO concludes that each of Fannie Mae's arguments is without merit.

6. Improvements in the Underwriting

GE Capital, in its reply comments, expressed concern that OFHEO would be persuaded by the Enterprises' arguments that the benchmark loss experience should be adjusted to reflect improvements in their underwriting practices, subsequent to the benchmark period. GE noted that although the Enterprises have improved their underwriting techniques since 1986, these improvements may not serve to reduce the frequency of default rates, given regional recessions such as in California and New England that occurred after 1986.

OFHEO believes that it would be inconsistent with the 1992 Act and inappropriate to adjust the benchmark loss experience based on the view that the Enterprises have improved their underwriting. First, improved underwriting is not relevant to identifying the benchmark loss experience, i.e., the worst time and place for credit stress. Rather, Congress intended the benchmark loss experience to define a severe level of credit stress that the Enterprises should be able to survive during a ten year period. To

''adjust'' for improved underwriting would be inconsistent with the statute, since it suggests that the Enterprises could never experience such a level of credit stress again. In addition, periodic modifications based on changes in underwriting would be difficult to implement.

E. Enterprise Data

In NPR2, OFHEO explained that the stress test would utilize data characterizing an Enterprise's assets, liabilities, stockholders equity, and off-balance sheet items at a point in time (''starting position data''). Under the proposal, OFHEO anticipated that each Enterprise would submit all data for mortgages, securities, and derivative contracts at the instrument level. The proposed stress test aggregated individual loans into groups with common risk and cash flow characteristics, known as ''loan groups.''[61] Data for these loans groups, instead of individual loans, were used as inputs by the mortgage performance and cash flow components of the stress test. In addition to the loan groups for existing loans, the stress test created loan group data for mortgages expected to be added to the Enterprises' books of business as a result of commitments outstanding as of the reporting date, using a process that is discussed in the ''Commitments'' section of this preamble III. F., Commitments. With respect to nonmortgage financial instruments (investments, debt, and derivative contracts), NPR2 proposed to project their cash flows at the individual instrument level rather than at an aggregated level, because they are fewer and more diverse.

1. Comments

Only Freddie Mac and Fannie Mae commented on OFHEO's proposed treatment of Enterprise data for the stress test. Both Enterprises emphasized the complexity of the proposed data submission process. Freddie Mac stated that in its submission for the second quarter of 1997, it provided more than 600 million data elements to OFHEO, which OFHEO then ''translated'' into data sets. It stated that this process results in ''a substantial number of translation errors'' which could impair the accuracy and reliability of the stress test. Similarly, Fannie Mae attributed most of the difficulty in operationalizing the stress test to the use and handling of instrument-level data, since the regulation requires the exchange, management and application of data on hundreds of thousands of different instruments and contracts.

Because of these problems, both Enterprises recommended that they, rather than OFHEO, be responsible for compiling and, where appropriate, aggregating the data into a standardized report, which would then be submitted to OFHEO. Freddie Mac stated that OFHEO should eliminate the need to perform data file translations by requiring the Enterprises to report their data files in a standardized format that OFHEO specifies in a ''call-report-like'' approach. Similarly, Fannie Mae recommended that each Enterprise submit a RBC Report with standardized elements.[62] Both Enterprises stated that such an approach is similar to the one taken by other Federal financial regulators with their reporting and capital requirements.

2. OFHEO's Response

Consistent with the comments, OFHEO has decided to have the Enterprises compile, and, where appropriate, aggregate their data and submit it to OFHEO in a standardized format specified by OFHEO. To implement this approach, OFHEO has specified a RBC Report with instructions for aggregating and reporting data in a standardized format. OFHEO agrees with the commenters that the data submission process must result in the submission of complete and accurate inputs to allow for the reliable and timely generation of a risk-based capital number. OFHEO believes that the approach in the final rule will fulfill this goal, because it serves to increase the efficiency and transparency of the process and the timeliness of the capital classification. OFHEO further believes that the data submission process will continue to be reliable, because each Enterprise will be required to certify that its submission is complete and accurate. In addition, the compilation of such data by the Enterprises will be subject to examination by OFHEO. This approach will permit capital classifications to be more timely because the standardized data can be input directly into the stress test without the need for data translation by OFHEO.

The stress test makes provision for items reported by the Enterprises that do not fall into the categories specified in the RBC Report or items for which the data is incomplete. If the item is a new activity, it will be treated as specified in section 3.11, Treatment of New Enterprise Activities, of the Regulation Appendix. Otherwise, where there is no appropriate specified treatment in the Regulation Appendix, or where data required to model the item are missing and there is no computational equivalent for such data and no available proxy acceptable to OFHEO, the item will be given one of the conservative treatments specified in section 3.9, Alternative Modeling Treatments, of the Regulation Appendix, depending on whether the item is an asset, a liability, or an off-balance sheet item. The treatments vary in the up-rate and down-rate scenarios and prescribe values for missing terms needed to determine cash flows. It is necessary to make provision for such items in order to permit the stress test to operate with incomplete data and to take into account highly unusual items that cannot be accommodated by specific stress test treatments. OFHEO expects that there will be few of these items in any given quarter.

F. Commitments

1. Background

The 1992 Act specifies that during the stress period the Enterprises will purchase no additional mortgages nor issue any MBS, except that—

> [a]ny contractual commitments of the enterprise to purchase mortgages or issue securities will be fulfilled. The characteristics of resulting mortgage purchases, securities issued, and other financing will be consistent with the contractual terms of such commitments, recent experience, and the economic characteristics of the stress period.[63]

The term ''contractual commitments'' generally refers to binding agreements that the Enterprises enter into with

[61] For example, a loan group might include all 30-year fixed-rate mortgages for single family homes in the same geographic region, originated in the same year, with similar interest rates and LTVs, and held in an Enterprise's portfolio. Such a process would allow over 24 million loans to be aggregated into a smaller number of loan groups that capture the important risk characteristics. Even with aggregation, there would be thousands of loan groups.

[62] These recommendations were accompanied by recommendations that the Enterprises be allowed to use models they would develop to OFHEO specifications to compute their risk-based capital requirement and report it to OFHEO along with the RBC Report. This recommendation is discussed in III. B., Operational Workability of the Regulation.

[63] 12 U.S.C. 4611(a)(3)(A). The 1992 Act does provide for later amendment of the rule to address new business during the stress period, but not until after the risk-based capital regulation is final. The 1992 Act requires that, within one year after this regulation is issued, the Director of the Congressional Budget Office and the Comptroller General of the United States shall each submit to the Congress a study of the advisability and appropriate form of any new business assumptions to be incorporated in the stress test. 12 U.S.C. 4611(a)(3)(C). 12 U.S.C. 4611(a)(3)(B) authorizes the Director to consider these studies and make certain new business assumptions. However, that subparagraph does not become effective until four years after the risk-based capital regulation has been issued.

seller/servicers to purchase mortgages or to swap mortgages for MBS. The term also refers to agreements to sell such securities to investors.

In NPR2, OFHEO proposed to model commitments outstanding on the beginning date of the stress test by adding new loans to the books of business of the Enterprises during the first year of the stress test, using specified decision rules that govern the volume and characteristics of these new loans. To avoid the complexity of modeling the mix of securitized mortgages versus those purchased for portfolio (which is largely determined by seller/servicers, based on a number of market factors) NPR2 specified that all loans delivered under commitments would be securitized. Second, NPR2 specified that, in the down-rate scenario, 100 percent of all loans that the Enterprises are obligated to accept would be delivered and, in the up-rate scenario, 75 percent of those loans would be delivered. Third, the proposal specified that, in the up-rate scenario, loans would be delivered over the first six months of the stress test and, in the down-rate scenario, over the first three months, at the rates specified in Table 3.

TABLE 3.—MORTGAGE DELIVERIES BY MONTH OF THE STRESS TEST AS A PERCENTAGE OF TOTAL COMMITMENTS

Months	Up-Rate Scenario	Down-Rate Scenario
1	18.75%	62.50%
2	18.75%	25.00%
3	12.5%	12.50%
4	12.5%	0.00%
5	6.25%	0.00%
6	6.25%	0.00%
Total	75%	100%

Finally, OFHEO proposed that the mix of characteristics (type, term, LTV ratio, coupon, geographic location, and credit enhancements) of commitment loans would be based upon the characteristics in loans that were delivered for securitization within the immediately preceding six-month period.

2. Comments and Responses

a. General Comments

Only the two Enterprises commented upon the proposed treatment of commitments. Both Enterprises agreed with OFHEO's decision that all loans delivered under commitments would be securitized. On the other hand, both Enterprises expressed concern that the capital impact of commitments was too great and that the stress test may overstate the risks posed by outstanding commitments. They cautioned that such an overstatement could reduce the use of certain types of commitments.

Freddie Mac stated that OFHEO's approach was probably more complex than is warranted, but, nevertheless, would be operationally workable. However, Freddie Mac also stated that if its recommended changes in the modeling approach to commitments and adjustments to the benchmark loss experience are not made, the Enterprises will have strong economic incentives to reduce the use of longer term commitments and further that ''it is doubtful that commitments could support [NPR2] capital levels.'' Fannie Mae made similar comments, suggesting that ''the proposed regulation's failure to recognize behavioral differences among commitment types may unnecessarily restrict the widespread use of optional commitments.''

In response, OFHEO notes that its decisions about how to model commitments are not intended to promote or discourage the use of one type of commitment over another, or to encourage the use of commitments in general. To the extent that long-term commitments may have a greater capital impact than short-term commitments, that is due to the relative level of risk of each type of commitment. Further, if empirical analysis regarding commitments indicates that the stress test should be modified, OFHEO will consider doing so. However, in the absence of historical data from which to construct a statistical model of commitments, the final regulation includes a few straightforward and conservative decision rules, which reflect the conditions of the stress period and the operation of commitment agreements. These rules make the commitments model easily replicable and the impact of commitments on capital predictable.

b. Remittance Cycle

Freddie Mac pointed out that NPR2 proposes to set the remittance cycle for commitment loans to the shortest period used at each Enterprise, even though some loans delivered and securitized just prior to the start of the stress period might have different remittance cycles. The final rule responds to this comment by modeling the float period (the time between receipt of funds by the Enterprise and remittance to security holders), which is the relevant portion of the remittance cycle for securitized loans.[64] The float period is set using the average float days weighted by UPB for each commitment loan group category in the same proportions experienced by each Enterprise in securitized single family loans that were originated and delivered within six months prior to the start of the stress test.

c. Credit Enhancements

Freddie Mac pointed out that, although commitment loan groups used in the model carried credit enhancements based upon each Enterprise's history for the prior six months, the NPR did not specifically reference credit enhancements among the characteristics of the loan groups. The final rule clarifies that mortgage insurance credit enhancements will be assigned to the commitment loans in the same proportions experienced by each Enterprise in securitized single family loans that were originated and delivered within six months prior to the start of the stress test. OFHEO notes that credit enhancements other than mortgage insurance are not applied to commitment loan groups in the final rule. Given the change to contract-level detail in the modeling of credit enhancements in the final rule, assignment of other types of credit enhancements would have required OFHEO to include speculative assumptions about the terms of future credit enhancement contracts. Including these other enhancements would also have added excessive complexity to the model, given the relatively small number of loans that would be affected.

d. Alternative Delivery Assumptions

(i) Comments

Fannie Mae recommended alternative modeling assumptions that, it asserted, better distinguished between the different types of commitments than those treatments proposed by OFHEO.[65] Fannie Mae suggested that OFHEO erred by treating all outstanding commitments as the same type of contractual arrangement. Specifically, Fannie Mae stated that the specified percentages of loans delivered under commitments (fill rates) ignore the large number of optional commitments and suggested that fill rates of 50 percent in the up-rate and 75 percent in the down-rate would

[64] *See* sections 3.2.2.1, Loan Data and 3.6.3.7.2, Stress Test Whole Loan Cash Flow Inputs, of the Regulation Appendix which require float days as an input.

[65] Fannie Mae's NPR2 comment letter also included an ''Issue Brief'' authored by Ernst & Young LLP, which provided further detail supporting Fannie Mae's recommendations.

be most appropriate. Fannie Mae also asserted that the three- and six-month delivery windows were unrealistically short and that deliveries in both scenarios were too front-loaded, suggesting instead periods of six and twelve months with deliveries spaced evenly across those periods. Fannie Mae further suggested that OFHEO refine the definition of ''commitment'' to reflect different levels of commitment in different agreements, although it did not explain precisely how this refinement should be reflected in the stress test.

(ii) OFHEO Response

OFHEO has studied the alternatives recommended by Fannie Mae and has concluded that they are no more precise or reasonable than those in the proposed regulation. First, contrary to Fannie Mae's assertion, OFHEO did not assume that all commitments were of the same type. Specifying less than 100 percent deliveries in the up-rate scenario is a recognition that some commitments are optional and that sellers under those commitments are not required to deliver all the loans specified in the agreement. Second, OFHEO determined that the front-loaded delivery schedule is appropriate because deliveries under individual commitment contracts tend to be concentrated in the early months of the contract. This decision rule also recognizes that at any point in time outstanding commitments are of differing ages. Some will only have a few days left during which a seller can deliver loans and some will have just recently been executed. Accordingly, outstanding commitments would begin to expire rapidly over the first few months of the stress test. Thus, even if deliveries were made evenly over the course of each individual commitment, the total deliveries would drop off quickly within the first few months of the stress test. Also, mortgage lenders do not enter into mandatory commitments for loans they are not reasonably certain they have in the pipeline and these loans are generally delivered within a few months. Loans under optional commitments also tend to be delivered early, because the commitments become outdated rapidly as the market changes and sellers negotiate new agreements.

OFHEO recognizes that the assumptions suggested by Fannie Mae in regard to both fill rates and delivery schedule are not necessarily wrong or unreasonable. However, in the absence of any data demonstrating the historical or current mix of outstanding commitment types, differences in deliveries under different commitment types, mix of loan types delivered under commitments, or the period of time over which deliveries under commitments actually occur, OFHEO will use the more conservative approach specified in the rule.

e. Mix of Loan Characteristics

Fannie Mae also recommended that OFHEO specify the mix of characteristics for loans delivered under commitments based on the mix of loans in an Enterprise's portfolio, rather than on the mix of recent deliveries. Fannie Mae expressed concern that basing the mix upon recent deliveries might weight one-time purchases of a particular loan type too heavily.

As discussed in detail in NPR2 in response to a similar comment from Freddie Mac on the ANPR,[66] OFHEO has seen no evidence that the mix in the current loan portfolio is a good proxy for the mix of loans delivered under commitments. Neither has OFHEO seen evidence of a one-time purchase so large that it would skew significantly or inappropriately the mix of loans delivered over six months. Also, this decision rule reflects recent changes in an Enterprise's business decisions and, in this sense, is more sensitive to risk than basing the mix on the total loan portfolio. Finally, the mix of loan characteristics has a limited impact on the capital requirement, because the Enterprises bear no interest rate risk on loans delivered under commitments, which are all securitized. For these reasons, OFHEO continues to view the recent deliveries as the best available indicator of the mix of characteristics of loans to be delivered in the stress test. Accordingly, this aspect of the commitments specification has not changed in the final rule.

f. Pair-off Fees

Fannie Mae also criticized the proposed stress test because it did not account for pair-off fees that would be paid on undelivered loans under mandatory commitments in the up-rate scenario. OFHEO has no data from the Enterprises indicating when, how often, or in what amounts pair-off fees are charged and no data indicating what percentage of commitment agreements provide for the payment of pair-off fees. Given the lack of these data, or even data indicating actual percentages of loans delivered under commitments, OFHEO had no basis upon which to include a credit for pair-off fees in the stress test and has not modified the proposed rule to do so.

[66] 64 FR 18165–18166, April 13, 1999.

g. Data

Although the final regulation's commitments specifications are little changed from those proposed, OFHEO views commitments as an area that is worthy of additional study and, therefore, is considering requiring the Enterprises to collect data about commitments that would allow empirical analysis in this area. For example, if the Enterprises had tracked delivery percentages and timing under commitments, a far more precise model, such as is suggested in Fannie Mae's comments, could be constructed. If these data had been tracked by commitment type and length of term, an even more sophisticated model would be possible. Such data and the analysis they would facilitate might provide OFHEO the basis upon which to modify the specifications in the existing commitments model or to develop a more finely-tuned model.

G. Interest Rates

Interest rates are a key component of the adverse economic conditions of the stress test. The ten-year constant maturity Treasury yield (CMT), as specified by the 1992 Act, provides the basis for the severe interest rate stress in the stress test. The stress test also incorporates a number of other interest rates, the levels of which will determine the volumes of mortgage prepayments and defaults; the cost of new debt issues and earnings on new investments; and rates paid or earned on assets, liabilities, and derivative contracts.

The 1992 Act specifies the path of the CMT for ten-year securities (ten-year CMT) for two interest-rate scenarios during the stress period.[67] However, for the determination of all CMT maturities other than the ten-year CMT, the 1992 Act states only that they will change relative to the ten-year CMT in patterns and for durations that are reasonably related to historical experience and are judged reasonable by the Director.[68] For non-CMT interest rates, the 1992 Act simply states that characteristics of the stress period that are not specified will be determined by the Director, on the basis of available information, to be most consistent with the stress period.[69] Therefore, the final rule specifies the CMT yield curves and the spread relationships between CMT series and other interest rates that will determine the levels of all interest rates in the stress test.

[67] 12 U.S.C. 4611(a)(2).

[68] 12 U.S.C. 4611(a)(2)(D).

[69] 12 U.S.C. 4611(b)(2).

1. Proposed Rule

In NPR2, OFHEO proposed that the required changes to the ten-year CMT would occur in twelve equal monthly increments from the starting point for the ten-year CMT, which is the average of the daily ten-year CMT for the month preceding the stress period. As specified in the 1992 Act, the ten-year CMT would then remain at the new level for the last nine years of the stress period.

The proposed rule also established the Treasury yield curve for the stress period in relation to the movements in the ten-year CMT. In the down-rate scenario, the rule specified an upward sloping yield curve during the last nine years of the stress period. In the up-rate scenario, the rule specified a flat yield curve for the last nine years of the stress period, i.e., yields of other CMT maturities are equal to that of the ten-year CMT.

The stress test must project the levels for a number of non-CMT rates that affect the Enterprises' business performance. Some of these key rates are the Federal Funds rate, London Inter-Bank Offered Rate (LIBOR), Federal Home Loan Bank 11th District Cost of Funds Index (COFI), and Enterprise Cost of Funds rates. The proposed rule established these rates using Autoregressive Integrated Moving Average (ARIMA) procedures, a statistical estimation technique for projecting time series. The estimation is based upon each series' historical spread to the CMT with a comparable maturity. In addition, NPR2 specified that in projecting the Enterprise Cost of Funds rates, the stress test would add a 50-basis-point premium after month 12, representing the additional cost of borrowing that might be anticipated if an Enterprise were undergoing financial stress.

2. Comments and Responses

OFHEO received many comments on the NPR2 interest rate specifications from the Enterprises, mortgage industry trade groups, investment banking firms, and a major bank. Some comments criticized the Treasury yield curve specifications, suggesting that other curves would be more consistent with historical averages. Most commenters said the specifications for non-CMTs were unnecessarily complex. Both Enterprises objected to the use of the DRI Agency Cost of Funds rates, suggesting that the quality control for that index was inadequate. These comments are discussed in detail below.

a. Specification of the Flat Yield Curve in the Up-Rate Scenario

(i) Comments

The Enterprises and an investment bank criticized OFHEO's proposal to transition to a flat yield curve in the last nine years of the stress test in the up-rate scenario. These commenters agreed that the yield curve historically tends to flatten or invert immediately after upward interest rate shocks, but they asserted that the yield curve resumes a more normal upward sloping shape during extended periods of stable rates. Both Enterprises questioned OFHEO's analysis of historical yield curve data and submitted studies supporting their conclusions. More specifically, Fannie Mae stated that OFHEO misdirected the analysis by assuming that yields would remain constant during the last nine years of the stress test and that OFHEO based its analysis on regression equations that were misspecified. The Enterprises also argued that the flat yield curve would slow prepayments inappropriately by eliminating any refinancing incentive. Freddie Mac suggested that the flat yield curve distorts the cost of new debt in the stress test by creating inappropriately high refunding costs. Fannie Mae argued that by potentially increasing short-term Treasury yields by more than the increase in the ten-year CMT, the flat yield curve specification imposes more stress than Congress intended in the 1992 Act. No commenter objected to use of the yield curves specified in the down-rate scenario, although Freddie Mac stated that the curve was steeper in the last nine years of the stress period than suggested by historical experience.

(ii) OFHEO's Response

The 1992 Act includes two requirements concerning stress period CMTs other than the ten-year CMT.[70] First, the other CMTs must move in patterns and for durations relative to the ten-year CMT that the Director determines are reasonably related to historical experience. Second, these movements must be judged reasonable by the Director. The second requirement is more general, providing that the resulting yield curves should be reasonable within the context of the stress test and the overall purposes of the 1992 Act.

After reviewing the comments, OFHEO has determined that it should not alter the yield curves specified in NPR2. As mentioned above, the commenters agreed that yield curves tend to flatten when interest rates increase sharply and tend to steepen when rates decline sharply. The regulation reflects this general historical tendency in both interest rate scenarios during the first year of the stress period. Because the magnitude and speed of the stress test changes in the ten-year CMT exceed historical experience, it is reasonable to project that yield curve changes would be unusually large. OFHEO was also guided by the requirement that the ten-year CMT remain constant during the last nine years of the stress period. Such constancy is far different from any historical period. OFHEO has determined that a constant yield curve during the last nine years is the most reasonable and consistent approach, and, as discussed in the preamble to NPR2, best ties capital to risk.

To select the constant yield curves, OFHEO examined historical average yield curves and observed that the curves were consistently flatter the more ten-year CMT yields increased and consistently steeper the more ten-year CMT yields decreased. Given the large size of the yield changes in the stress test, OFHEO selected yield curves that approximated the bounds of historical experience. OFHEO further supported that choice with simple regression equations that illustrated the pattern observed.[71]

Fannie Mae argued that the specified yield curves in both scenarios are the most stressful ever observed. However, OFHEO's analysis of the shapes of historical yield curves indicated that more severely sloped yield curves have occurred than those that OFHEO chose for the stress test. In periods where interest rates have declined sharply, yield curves with slopes steeper than 0.77 were observed. In periods where interest rates rose rapidly, yield curves have frequently inverted. Although these yield curves have not persisted for periods of many years, severe interest rate shocks have also not persisted.

It is important to note that, in addition to historical analysis, the selection of the actual yield curves in the stress test also took into account the role of interest rates in the stress test. In

[70] ''Yields of Treasury instruments with other terms to maturity will change relative to the 10-year constant maturity Treasury yield in patterns and for durations that are reasonably related to historical experience and are judged reasonable by the Director.'' 12 U.S.C. 4611(a)(2)(D).

[71] The constant terms in the regression equations were misreported in the preamble to NPR2 as 0.86. The correct estimates were 0.67 for the full sample and 0.66 for the estimation based on quartile averages. However, the projections of yield curves under stress test conditions were based on the correct coefficients. Further, OFHEO determined upon review that the regression equations were appropriately specified as described in footnote 148 in NPR2. 65 FR 18148, April 13, 1999.

this regard, consistent with the requirement in the 1992 Act that the Director judge interest rates to be reasonable,[72] it is appropriate and reasonable within the context of a stress test to specify yield curves that remain more stressful than the average yield curve. Accordingly, OFHEO has selected curves that have been observed frequently in the past, but, as applied in the regulation, are unusually stressful for an extended period.

The Enterprises argued, in effect, that the flat yield curve adds additional risk to their portfolios in the up-rate scenario of the stress test by raising the cost of short term debt by a greater amount and percent than the increase in the ten-year CMT. They seek an approach that recognizes a discount for short-term debt, which would lower the capital requirement in the up-rate scenario. OFHEO disagrees. The 1992 Act does not suggest that other interest rates should not move more than the ten-year CMT.

For all the above reasons, OFHEO has determined that the most reasonable means of relating the yield curve to historical experience recognizes the general direction of yield curve changes during changing interest rate environments without attempting to fine tune that historical analysis throughout the ten years of the stress period. Accordingly, OFHEO has further determined that, given the design of the stress test, a yield curve that transitions during the first year to a flat curve for the last nine years of the up-rate scenario and to an upward sloping yield curve for the last nine years of the down-rate scenario best meets the dual requirements of the 1992 Act.

b. Specification of Non-Treasury Rates

(i) Use of ARIMA Methodology

Numerous commenters criticized the proposed use of ARIMA models to project non-Treasury rates during the stress period. For a variety of reasons, the commenters all concluded that ARIMA models were too complex and inaccurate to be relied upon to project non-Treasury rates in a stress test. The models were argued to result in volatile and unpredictable projections that would be difficult for parties other than OFHEO to replicate. Freddie Mac recommended that OFHEO project non-Treasury yields based on the average spread over the appropriate CMT for the period two years prior to the beginning of the stress test. No commenter favored the proposed ARIMA approach to projecting non-Treasury interest rates.

[72] 12 U.S.C. 4611(a)(2)(D).

OFHEO agrees that a different method of modeling non-Treasury rates is appropriate. The final rule, therefore, discontinues use of the ARIMA models. Instead, OFHEO will use the average spread between each non-Treasury rate and its comparable maturity CMT for the two-year period just prior to the beginning of the stress test. This approach presents several advantages over use of ARIMA models. First, it is easily implemented, and replicable by parties other than OFHEO. Second, it is far less likely to impose large, erratic and unpredictable swings in interest rate spreads. Finally, it is consistent with the use of a fixed specification of the Treasury yield curve, rather than a varying curve based on a statistical model.

(ii) Proportional and Absolute Spreads

Several commenters suggested that OFHEO consider whether it was more appropriate to project certain non-Treasury rates based upon the historical spreads in basis points between those rates and the corresponding maturity CMT than to project the rates based on their historical proportional relationships.

For nonmortgage interest rates, OFHEO found that proportional spreads correlated better historically than absolute spreads. However, for mortgage rates in the stress test, which are calculated from two-year averages of the Bloomberg indexes for conventional 30-year fixed rate loans and conventional 15-year fixed rate loans, OFHEO found that absolute spreads provided a better correlation.

For these reasons, the final rule continues to use proportional spreads to determine all interest rate series in the stress test, except mortgage rates. In modeling mortgage rates, the final rule bases the calculations upon absolute spreads.

c. Data Sources

Both Enterprises commented that DRI McGraw-Hill's (DRI) Federal Agency Cost of Funds, which is the series used in the proposed regulation to calculate the Enterprise Cost of Funds during the stress period, was inappropriate for that purpose. OFHEO also notes that the DRI series has been discontinued since the publication of NPR2.

Because the DRI series was discontinued, OFHEO has specified a different index for calculating the Enterprises' Cost of Funds. The only commercially available index suitable for this purpose is the Bloomberg Generic Agency Cost of Funds. As an alternative, OFHEO considered developing its own index of the Enterprises' Cost of Funds. OFHEO has determined that developing its own index is the preferable option, because OFHEO has no control over the content, methodology, quality and availability of the Bloomberg index. However, development of such an index will take considerable time and OFHEO will, therefore, utilize the Bloomberg index in place of the DRI index until OFHEO develops a more appropriate index.

3. Yields on Enterprise Debt

a. Comments

A number of commenters, including both Enterprises, objected to the proposed method for calculating the interest rates at which the Enterprises issue new debt after the first year of the stress period. The Enterprises' borrowing rate in NPR2 included the addition of a 50-basis-point premium to the projected Agency Cost of Funds after the twelfth month of the stress period. Some commenters suggested there should be no premium at all on Enterprise debt costs. These commenters suggested that the debt markets would react differently to an undercapitalized Enterprise than to other undercapitalized businesses for varying reasons, including the Enterprises' special Federal status and the confidence that investors in the debt market would have in the regulatory oversight of the Enterprises. Both Enterprises argued that the premium should be applied to all non-Treasury interest rate series rather than only to the Enterprises' debt costs. The Enterprises each submitted studies from consultants that offered a number of reasons to support eliminating the debt premium. Implicit in the Enterprises' comments was an assumption that the economic conditions of the stress period would affect other borrowers as much or more than the Enterprises. One Enterprise suggested that the debt markets would not require a premium, because investors would recognize that the 30-percent multiplier for operations and management risk would never be exhausted. To support these arguments, commenters submitted historical analyses to show that when the spreads between Enterprise debt rates and Treasury yields have widened, other non-Treasury debt spreads have widened as much or more, even at a time when Fannie Mae had negative net worth.

Commenters also pointed out that applying a fixed-debt premium at a fixed point in the stress test does not take into consideration the condition of the Enterprise at the start of the stress test. They suggested that one year into

the stress test an Enterprise may appear financially strong to investors and that a debt premium would not be demanded by the market. The debt premium was also criticized for failing to distinguish between premiums on long- and short-term debt. Commenters argued that the markets always demand a larger premium on long-term debt.

b. OFHEO's Response

OFHEO does not agree with the assumption of commenters that investors will be so confident that the Federal government would support Enterprise debt that the debt market will ignore the financial condition of the company. To incorporate such an assumption into the stress test would amount to the modeling of an implied federal guarantee of Enterprise debt. The ''implied'' guarantee is, at most, a market perception and not a legal obligation of the Federal government. There can be no assurance that Congress would act to prevent loss to investors, and market perceptions, therefore, may change. Further, it would be particularly inappropriate to include such an assumption in a stress test designed to ensure that the government is never called upon to deal with a default by an Enterprise. To do so would weaken the regulatory structure on the grounds that the public perceives the structure to be strong-an imprudent course for any regulator.

Similarly, OFHEO disagrees with the argument that the stress test should assume that the market would not demand a premium because the Enterprises have a financial regulator and are subject to stringent risk-based and minimum capital standards. Although OFHEO anticipates that its existence and the capital regulations it issues will create public confidence that the Enterprises will continue to be adequately capitalized and operated safely and soundly, OFHEO will not presume that the mere existence of this regulatory structure would prevent a deterioration in the market for an Enterprise's debt when the Enterprise is undercapitalized. Among other things, the increased regulation of the Enterprises has also imposed clearer capital requirements and greater disclosure regarding their operations—a trend that OFHEO expects to continue. It is, therefore, possible that investors will be more sensitive to capital inadequacies at the Enterprises than they were in the past.

OFHEO was not convinced by arguments that the market would not demand a premium because investors would rely on the implied Federal guarantee or the regulatory structure, and was not persuaded by commenter's arguments, based on sparse historical data, that other spreads would widen by as much or more than those of government sponsored enterprises. Nevertheless, relevant historical data to support a new debt premium are also sparse. There has been only one, relatively brief, period of time in the early 1980s when one of the Enterprises experienced financial stress approaching the magnitude specified in the stress test. The only other similar event involved the Farm Credit system in the mid-1980s. In addition, it is conceivable, as some comments noted, that events that cause a widening of the spread between the Enterprises' debt rates and Treasuries might also cause other spreads to widen. These spreads have an important effect on the value of hedging instruments and some Enterprise asset returns.

In light of these considerations, OFHEO has determined that there is too little historical experience on which to determine definitively whether other spreads to Treasuries would widen as much as the Enterprises' spreads or to base an estimate of how much the Enterprises' spreads would widen. Consequently, OFHEO has decided not to include a premium on new debt in the final rule. The final regulation does, however apply a 50-basis-point call premium to new five-year callable debt. The cost of new debt is a likely area for future research and for refinement of the rule, because assumptions about these various other spreads may comprise an area of significant risk to the Enterprises.

H. Property Valuation

In order to update origination LTVs to the start of the stress test and to account for changes during the stress period, OFHEO proposed property valuation methodologies for single family and multifamily loans. Because these methodologies were different for single family and multifamily loans, comments and responses related to property valuation are discussed separately for single family and multifamily loans.

1. Single Family

In NPR1, OFHEO proposed to use its House Price Index (HPI) to calculate property values for the purpose of determining current LTVs for Enterprise loans as of the starting date of the stress test. For this purpose, OFHEO proposed to use the HPI of the Census Division in which the loan originated along with the related volatility parameters. In NPR2, OFHEO proposed to determine house price growth rates during the stress test using its HPI values from 1984 to 1993 for the West South Central Census Division, the division in which most of the ALMO benchmark states are located,[73] along with the volatility parameters for the Census Division in which the loan was originated.

The HPI utilizes a repeat transactions estimation process based on a stochastic model of individual housing values. The indexes estimated using this process represent a geometric mean. Along with the HPI, OFHEO publishes the factors needed to adjust the indexes from geometric to arithmethic means (the Goetzman correction), an adjustment needed for some applications of the HPI.[74] However, OFHEO proposed to use the HPI without the Goetzman correction in the stress test.

The 1992 Act requires that if interest rates rise by more than 50 percent of the average ten-year CMT for the nine months prior to the start of the stress test, losses must be adjusted to account for general inflation. The stress test proposed by NPR2 implemented this requirement by increasing house prices by the amount the ten-year CMT, after the upward shock in interest rates, exceeds the average ten-year CMT for the nine months prior to the start of the stress period. This amount is compounded over the remainder of the stress period for a cumulative inflation adjustment. The adjustment is applied over the last 60 months of the stress period.[75]

The comments related to the use of the HPI in the stress test and comments on the inflation adjustment are discussed below.

a. HPI Issues

Comments related to the use of the HPI in the stress test focused on four issues—(1) The use of a geometric index instead of an arithmetic index; (2) the restriction of the database to loans financing single family detached properties, where the loans were eventually purchased or guaranteed by the Enterprises; (3) the HPI volatility parameters used during the stress period; and (4) the procyclical effect of the methodology on the capital requirement.

(i) Geometric Mean

The Enterprises objected to OFHEO's decision not to use the HPI without the Goetzman correction for stress test

[73] The West South Central Division includes all of the ALMO states except Mississippi.

[74] A geometric mean of a group of n numbers is the nth root of their product, whereas the arithmetic mean, which Freddie Mac uses in its house price index, is the simple average of the numbers.

[75] *See* section 3.4, Property Valuation of NPR2, 64 FR 18236, April 13, 1999.

purposes. However, NAHB noted that, for the purpose of meeting the requirements of the 1992 Act, OFHEO's index is superior to other house price indexes, including the Conforming House Price Index published by the Enterprises, which uses an arithmetic mean.

OFHEO continues to believe that a geometric index is more appropriate for the stress test than an arithmetic index, primarily because a geometric index approximates a median value, whereas an arithmetic index results in an average value. Because housing values are distributed lognormally (i.e., skewed to the right), the median is a better measure of central tendency for a loan-level analysis, such as that reflected by the single family default and prepayment model, than the average. By definition, the average for a lognormal distribution that is skewed to the right will always lie above the median because the average in effect gives more weight than the median to ''outliers,'' in this case, loans that are experiencing appreciation far in excess of the majority. Therefore, the average will always be higher than the actual appreciation rates experienced by the majority of the individual loans. A geometric index results in values that are far closer to median and therefore gives far less weight to outliers. For the purpose of a stress test, OFHEO does not think it is appropriate to update property values using appreciation rates that are higher than those experienced by the majority of loans. Consequently, the final regulation continues to use the HPI without the Goetzman correction.

(ii) HPI Database

(a) Comments

A number of other commenters asserted that the house price vector used in the stress test is not stressful enough, resulting in losses that are understated relative to the benchmark loss experience, especially for low-LTV loans. These commenters noted that the house prices in the HPI for the West South Central Census Division from 1984–1993 evidence a 12 percent initial decline before increasing, while Moody's, Fitch, and other rating agencies use at least a 30 percent decline before increasing. They assert that this weaker decline in house prices is attributable to the exclusion from the HPI database of transactions involving single family homes that are not detached (i.e., condos, planned unit developments and 2–4 family homes) and the exclusion of foreclosure sales. The result, in the opinion of some commenters, is that the capital requirement is understated and biases are introduced in favor of low-LTV loans and older loans, which result in understated default rates. Some commenters who criticized the use of the HPI recommended that OFHEO use a different house price vector, such as one used by one of the rating agencies, and also calibrate single family default and prepayments rates to the benchmark by LTV ratio. (See further discussion of calibration to the benchmark loss experience in III.I.1.g., Relating Stress Test Default Rates to the Benchmark Loss Experience.)

Freddie Mac and Fannie Mae, in their reply comments, took issue with the comment that the HPI is biased upward because foreclosure sales are not included in the HPI database. Freddie Mac pointed out that, although foreclosure sales are not included in the database, the sale of the foreclosed property in an REO disposition is included if such a transaction results in a mortgage that an Enterprise buys. Freddie Mac further observed that the overall stringency of the stress test depends on whether the default and severity models are appropriately calibrated to the benchmark and that a more severe path of house price appreciation would lower the calibration constant used to ensure that the default and severity models produce credit loss in line with the benchmark loss experience, rather than make the stress test more severe.

(b) OFHEO's Response

OFHEO continues to believe that it is appropriate to use an index based on Enterprise data rather than rating agency assumptions to determine house price growth rates during the stress test. As noted in the ANPR and NPR1, OFHEO believes that the direct correspondence of the Enterprise database to the segment of the housing market served by the Enterprises make that database a more appropriate basis for determining a house price appreciation path for Enterprise loans during the stress period.

OFHEO also believes that the HPI is the most appropriate index available for establishing property values during the stress test, notwithstanding the restriction of the database to transactions involving single family detached homes. OFHEO restricted the database to single family detached loans because it is the dominant mortgage product and because the markets for PUDs, condos and 2–4 family homes have different behavioral characteristics. The impact of their exclusion is likely to be small because the Enterprises buy few of these loans.

OFHEO does not believe that the lack of foreclosure sales in the database makes the HPI unsuitable for use in the stress test. Even if the data on which the HPI is based resulted in an upward bias to house prices that understated default rates relative to the benchmark loss experience, the calibration of the default and severity rates to the benchmark loss experience would compensate for it.

(iii) Stress Test Volatility Parameters

To determine the path of house price appreciation during the stress period, NPR2 proposed to use the HPI for the West South Central Census (WSC) Division from the benchmark period (1984Q1 through 1993Q4), with the volatility parameters for the Census Division in which a loan was originated up to the start of and during the stress period. Although one commenter appeared to support this approach, others expressed concern that it would result in different capital requirements for otherwise identical loans in different Census Divisions. The commenters asserted that this would distort mortgage purchase incentives for the Enterprises and result in inconsistent treatment of consumers and inefficient economic outcomes. The Enterprises also expressed concern that the NPR2 approach, involving quarterly updates to Census Division volatility parameters, would make it difficult to anticipate the risk-based capital requirement and incorporate it into their operations. They urged OFHEO instead to apply fixed volatility parameters associated with the West South Central Census Division during the stress period.

The final regulation adopts the commenters' suggestionn to use the fixed volatility parameters associated with the West South Central Census Division. The final rule uses the West South Central volatility parameters as published in the Third Quarter, 1996 HPI Report, both in updating property values to the start of the stress test and in projecting changes in property values during the stress period.

(iv) Procyclicality

A number of commenters argued that the use of OFHEO's repeat transactions HPI to update LTV ratios for loans as of the start of the stress test may result in volatility that may understate Enterprise capital needs in times of house price ''bubbles'' [76] and possibly exacerbate house price declines. Higher levels of house price appreciation result in a lower probability of negative equity

[76] ''House price bubbles'' refers to the tendency of the rate of house price growth to accelerate before a decline.

(and hence lower default levels), which results in a lower capital requirement. (Conversely, lower levels of house price appreciation result in a higher probability of negative equity and hence higher default levels.) Thus, it was argued, the capital requirement would be lower during boom years and higher during recessionary periods. The commenters asserted that during periods of low or negative rates of house price growth, higher capital requirements would constrain the ability of the Enterprises to buy mortgages, potentially contributing to further housing value declines. To reduce this procyclicality in the capital requirement, the commenters recommended that OFHEO use a two-year moving average of HPI values rather than the HPI value in a single quarter to update LTVs to the start of the stress test.

In their reply comments, both Fannie Mae and Freddie Mac supported the idea that required capital should be high when economic risks are high. Fannie Mae agreed that use of a moving average would dampen the effects of rapid house price movements while still ''relating capital to broad-based and long-term risk.'' Freddie Mac did not support the use of a two-year moving average, citing factors that would mitigate excessive procyclicality. First, it was argued, booms and busts tend to be regional rather than national phenomena, and the Enterprises' portfolios are highly diversified, which limits their exposure to regional downturns and upturns. Second, Freddie Mac asserted that the Enterprises will manage their capital to provide stability in the secondary market for residential mortgages through the business cycle. Lastly, Freddie Mac noted that the minimum capital requirement and discretionary reclassification authority of the Director will ensure that the Enterprises maintain a minimum level of capital.

OFHEO did not adopt the commenters' suggestion to use a moving average of HPI values in the final rule. While a moving average would dampen both upward and downward short-term trends in home values and allow longer-term trends to have greater influence, OFHEO believes that the use of current LTVs determined by the HPI values in the quarter preceding the start of the stress test makes the test more effective as an early warning device. Smoothing the path of house price appreciation by using a moving average would allow an Enterprise to delay building capital needed to meet requirements of the stress test based on actual house price levels at the start of the stress test.

b. Inflation Adjustment

(i) Comments

The Enterprises and several other commenters argued that specifying an inflation adjustment based on the difference between the ten-year CMT after the stress test interest rate shock and the average ten-year CMT for the nine months prior to the stress test and applying the inflation adjustment over the last five years of the stress period results in inflation adjustments that are too low. The Enterprises stated that house prices generally keep pace with inflation under stress scenarios, and recommended that the inflation adjustment be 75 percent to 100 percent of the increase in the ten-year CMT, not just the component in excess of a 50 percent increase in the ten-year CMT, citing studies by consultants hired by Freddie Mac.[77] The Enterprises and some other commenters favored beginning the inflation adjustment as soon as the ten-year CMT is 50 percent above its average yield of the preceding nine months, rather than waiting until the last five years of the stress period. Fannie Mae argued that the intent of the inflation adjustment is that credit losses in the up-rate scenario should be lower than credit losses in the down-rate scenario at least when interest rates increase by more than 50 percent.

(ii) OFHEO's Response

The final regulation makes no change to the inflation adjustment. The assertion that the adjustment should be 75 to 100 percent of the total increase in the CMT is based upon hypothetical models and conjecture regarding the macroeconomic nature of such interest rate increases. These hypothetical models and presumed relationships among variables would result in inflation adjustments that would greatly reduce the credit stress in the up-rate scenario. As discussed above, many commenters have asserted that house prices are not stressful enough compared to those considered stressful by the rating agencies, which specify house price drops of 30 percent of more.

The 1992 Act recognizes that high interest rate environments are often characterized by high levels of general inflation that would exert upward pressure on house prices and mitigate some of the price decline that results from the interest rate shock. For this reason, an additional inflation adjustment for large increases in interest rates is required. However, this requirement should not be interpreted as implying that house price growth rates should increase in the full amount of the increase in interest rates. Economic conditions that drive stressful scenarios may cause house prices to deviate from the rate of general inflation for extended time periods. Typically, the immediate impact of interest rate increases is to dampen housing demand, which results in declining housing prices. Declining house prices discourage new construction, but the supply adjustment proceeds quite slowly as the existing housing stock deteriorates. The supply of land cannot adjust, so higher interest rates would continue to be associated with lower land values. Thus, it would not be unreasonable to observe a prolonged period of time in which the price of housing deviates sharply from other prices. For example, the crisis in the oil markets in the early 1980's caused substantial house price declines of approximately 12 percent in the West South Central Census Division during a period when the Bureau of Labor Statistics Consumer Price Index (CPI) rose by 19 percent. After housing prices in that area turned upward in 1989 and rose through 1993, they were only two percent higher than a decade earlier, while the CPI had risen 44 percent.

Lastly, an adjustment to house prices such as that recommended by the Enterprises would negate the credit stress of the benchmark loss experience. OFHEO believes that this is not consistent with Congressional intent and does not agree that the purpose of the inflation adjustment was to ensure that losses are greater in the down-rate scenario than in the up-rate scenario.

2. Multifamily Loans

For multifamily loans, OFHEO did not propose to use the HPI or any other repeat-sales or repeat-transaction index to update property values because of the inadequacies of any available property valuation indexes. To overcome this lack of a property valuation index, OFHEO proposed to use an earnings-based method to update property values and income. OFHEO proposed to base the property value on property net operating income (NOI) divided by a capitalization rate, which discounted

[77] Macroeconomic Advisers estimated the impact on home prices of the range of inflation outcomes using a structural model of housing sector. *See* Macroeconomic Advisers, LLC, ''House Prices under Alternative Interest Rate Paths'' (January 18, 1999). At the request of Freddie Mac, Michael Darby analyzed the economic scenario most consistent with the stress period and concluded that the inflationary environment that would be most consistent with the interest rate path described in the 1992 Act would result in an inflation adjustment 75 percent as large as the increase in interest rates. *See* Michael Darby, ''Consistent Macroeconomic Conditions for a Risk-Based Capital Stress Test'' (June 6, 1997).

the expected earnings stream while holding property-specific characteristics constant.

OFHEO proposed to update property NOI using expected rent growth and vacancy rates. Rent growth was derived from the rent of primary residence component of the CPI and multifamily vacancy rates were taken from the rental property vacancy rate series published by the Bureau of the Census (Census Vacancy Series). Because Enterprise purchases of multifamily loans are heavily concentrated in Metropolitan Statistical Areas (MSAs), MSA indexes were used, where available. However, the CPI rent index is only available for one MSA in the ALMO region during the benchmark period (1984–1993) and the Census Vacancy Series covering the ALMO region were not available prior to 1986. Therefore, in order to capture the economic conditions affecting multifamily loans in the ALMO benchmark loss experience, OFHEO turned to non-governmental sources of data published by the Institute for Real Estate Management (IREM). OFHEO used statistical relationships between IREM and CPI data and IREM and rental vacancy data to create government-equivalent series for the ALMO benchmark region and time period. Volatility estimates for rental rate inflation and vacancy rates were used to calculate the dispersion of multifamily property values, in much the same way volatility measures for the HPI series were used to measure dispersion of property values for single family loans.

a. Comments

Numerous comments criticized the proposal to update property values using the proposed capitalization rate model. Only Freddie Mac commented upon the specific choice of indexes for the projection of multifamily rents and vacancies in the stress test. Freddie Mac criticized OFHEO's proposal to utilize the combined CPI and IREM rental indexes as indicative of economic conditions in the benchmark region and time period, citing the relative paucity of multifamily data from the ALMO region in the relevant time frame. Freddie Mac noted that the proposed rule created little stress for multifamily loans, because it resulted in substantial increases in collateral values during the stress period. Fannie Mae likewise noted that the proposed model resulted in increases in property values, contrary to Fannie Mae's own experience in the southern California recession from 1991–1995, when property values declined significantly. Despite their criticisms of the property valuation component of the multifamily model, neither Enterprise suggested changing the method of computing rent growth or vacancy rates for the benchmark region and time period. Instead, they suggested other changes to the model, which included dropping any updating of property values during the stress period.

b. OFHEO Response

The comments criticizing the proposal to update property values are discussed in III.I.3.a.i., Negative Equity and Current LTV Variables, but for present purposes it is sufficient to note that OFHEO has decided not to update multifamily property values in the stress test. Nevertheless, the rental and vacancy indexes continue to play a key role in modeling changes in NOI and have a material impact on the debt service coverage ratio, a key variable in the revised multifamily default model. Because of the importance of these indexes in determining the values for this variable, OFHEO believed it important to consider certain modifications in the computation of these indexes, as discussed below.

After additional analysis, OFHEO found a better proxy for the rental growth rates in the ALMO benchmark region and time period than the government-equivalent series created from IREM data. That series is replaced in the final rule with the population-weighted (1990 Census) average of monthly rent growth rates [78] of Metropolitan Statistical Areas (MSAs) in the West South Central Census Division. CPI indexes are available for two Consolidated MSAs (CMSAs) and one MSA in that region—the Dallas/Fort Worth CMSA, the Houston/Galveston/Brazoria CMSA, and the New Orleans, MSA. OFHEO has found the Texas MSAs to be more reflective and representative of the stressful real estate market in the ALMO region during the benchmark period than the IREM rental data.

Because the rent growth and vacancy rates are used together in the stress test to determine NOI, OFHEO further determined it necessary to use a method consistent and compatible with the rent growth computation to compute the vacancy rates for the ALMO benchmark region. Therefore, in the final rule, ALMO benchmark region vacancy rates are modified from NPR2 in much the same manner as the rent price indexes. Like the corresponding rent price indexes, ALMO benchmark region vacancy rates are calculated using the population-weighted (1990 Census) average of annual vacancy rates for all the MSAs in the West South Central Census Division. Vacancy rate data are available for the Dallas, Houston, and Ft. Worth, Primary MSAs (PMSAs) and the New Orleans, San Antonio, and Oklahoma City, MSAs for 1986 forward. To create vacancy rate data for the ALMO benchmark region and time period for the first two years of the stress test, the ratio of the rental vacancy rates of the ALMO benchmark region and time period to U.S. rental vacancy rates for 1986 (16.8 percent versus 7.3 percent) was assumed to hold in 1984 and 1985. That ratio was applied to the U.S. rental vacancy rate in 1984 and 1985 to estimate vacancy rates in the ALMO benchmark region in those years.

These changes to the stress test rent growth and vacancy rates make the multifamily model more consistent with the single family model, because both models now use the same Census Division as a proxy for the property valuation indexes in the benchmark region and time period.

I. Mortgage Performance

In order to determine how mortgages would perform under the stress test, NPR2 proposed econometric models to simulate conditional rates of default, prepayment, and loss severity for each month of the stress period.[79] To reflect the significant differences in the nature of single family loans and multifamily loans, NPR2 proposed somewhat different models for single family and multifamily loans. Consequently, the comments and responses related to mortgage performance are discussed separately for single family loans and multifamily loans.

1. Single Family Mortgage Defaults and Prepayments

To account for the interaction of default and prepayment,[80] NPR2 proposed jointly estimated models of default and prepayment for three categories of loans. To reflect differing behavioral characteristics of these loans, NPR2 proposed three separate pairs of default and prepayment equations for

[78] Due to the extreme volatility of monthly changes in MSA rental indexes, monthly rent growth was calculated as the twelfth root of the year over year change in the rental indexes for each MSA. Due to different base years, population-weighted averages of the resulting MSA rent growth rates were taken to compute benchmark loss experience rent growth.

[79] The term ''default rate'' is used hereafter in this document to refer to ''conditional default rate,'' unless otherwise specified. The term ''conditional default rate'' refers to the percentage of loan principal outstanding at the start of a period that will default during that period.

[80] Default and prepayment represent options that borrowers choose between when they stop making regular monthly payments on a mortgage. The likelihood of one option being chosen affects the likelihood of the other being chosen.

30-year fixed rate mortgages (30FRMs), adjustable rate mortgages (ARMs), and all other types of single family products (Other SF Products). All three models treat the default and prepayment decisions as options, and they were jointly estimated using the multinominal logit statistical estimation method. The explanatory variables used in the proposed default equations for all three models were age, age squared, LTV at origination, probability of negative equity, occupancy status, and burnout.[81] Product type was also used as a variable in the Other SF Products Model to account for the different default behavior of the different types of products. The explanatory variables used in the proposed prepayment equations were age, age squared, LTV at origination, probability of negative equity, occupancy status, burnout, relative spread, the slope of the yield curve, season of the year (average effect), and relative loan size. For the Other SF Products Model, an additional variable, product type, was used to take into account the differences in prepayment behavior of the various types of products.

In order to reasonably relate default rates to the benchmark loss experience, OFHEO proposed to use a single calibration constant to calibrate the default function to the benchmark loss experience, so that under interest rates associated with the benchmark loss experience, the stress test would project ten-year cumulative default rates for a pool of loans with the characteristics of the benchmark sample that are comparable to the ten-year cumulative default rates of the benchmark loss experience. A similar calibration was made for loss severity rates.

Comments on these models are discussed below by topic.

a. Modeling Approach

The Enterprises found the joint modeling approach to be appropriate and ''essentially sound.''[82] Although the Enterprises had specific concerns about the models, they suggested that, rather than revising their specification or reestimating them, OFHEO could address their concerns by other model adjustments, discussed below in this section by topic. A number of other commenters questioned the joint modeling approach, primarily because it explicitly reflects the potentially offsetting effects of interest rate and credit stresses. Some of these commenters suggested that a better approach would be to evaluate the capital impacts of credit and interest rate risk separately. GE Capital and MICA expressed concern that OFHEO's model understates losses relative to the benchmark, produces inconsistent loss rates in the up- and down-rate scenarios, and permits the Enterprises to overcompensate in hedging one type of risk to offset another type of risk.

GE Capital and MICA proposed two alternative approaches to address their concerns, both of which involved elimination of the proposed default and loss severity calibration constants, adding new LTV-based calibration constants, and substituting Moody's triple-A regional home price decline for the West South Central HPI during the stress period. The first approach would calibrate the model to the benchmark using interest rates associated with the down-rate scenario. The other would calibrate the model using the interest rate path associated with the benchmark loss experience with a small prepayment calibration for high LTV loans.

OFHEO continues to believe that a joint approach to single family mortgage performance is both consistent with statutory direction and appropriate for regulatory purposes. The 1992 Act contemplates the calculation of a risk-based capital requirement based on interest rate and credit stresses experienced simultaneously. The sum of the effects of each experienced separately is not the same as the effects of the two experienced together. The 1992 Act also requires that stress test losses be reasonably related to the benchmark loss experience. OFHEO's model achieves this by calibrating stress test losses to the benchmark loss experience using the interest rates of the benchmark period and house price growth rates of the benchmark period in the West South Central Census Division, which includes most of the states of the ALMO region. Substituting the Moody's house price path for the house price path of the benchmark period and calibrating the mortgage performance models using an interest rate path other than that of the benchmark period would sever the ''reasonable relationship'' of stress test losses to benchmark loss experience. The final rule does, however, eliminate the single calibration constants and apply LTV-specific calibration.constants. These issues are further addressed by the discussions that follow.

b. Data Issues

The models proposed in NPR2 were estimated using all or a random sample of all historical data the Enterprises had available for loans they purchased and retained or securitized in the years 1979–1995, with origination years from 1979–1993.[83] This dataset had certain limitations. It did not, for example, include the last paid installment date for Freddie Mac defaulted loans,[84] or any data for loans securitized under Fannie Mae's swap program. In addition, it did not reflect loan performance for most of the 1990's. In spite of these data issues and their relationship to some of the concerns expressed about the default and prepayment models, commenters generally agreed that OFHEO need not reestimate the models proposed in NPR2 using a more up-to-date and more complete historical data set and should not further delay the final rule to do so.

Since the comment period closed, the Enterprises have provided updated and improved data to OFHEO. Working with this new data, OFHEO determined that certain model shortcomings, some identified by commenters and some by OFHEO, were best addressed using this more recent dataset. Consequently, OFHEO reestimated the single family models using ten percent random samples from a dataset comprised of loans that were originated in the years 1979–1997 and acquired by the Enterprises in the years 1979–1999. In addition to significantly increasing the number of loan observations, the new dataset remedies several data deficiencies noted in NPR2. The dataset includes the last paid installment date for both Enterprises and Fannie Mae securitized loan data from 1991-forward. OFHEO's testing of various model specifications using this updated dataset revealed that several variables that previously demonstrated explanatory significance were no longer statistically significant predictors of default, and these variables were dropped from the estimation of the model. In addition, other specifications of the models were changed slightly to address commenters' concerns. These changes are discussed below by topic.

[81] Season of the year and relative loans size were used in the estimation of the default equations, but omitted in the simulation to achieve average seasonal effect and average loan size.

[82] According to Fannie Mae, ''the level of detailed econometric modeling of loan performance is unmatched among risk-based capital regulations applicable to financial institutions.''

[83] The ARM equation used all available data; the fixed-rate 30-year and other single family products models used ten percent random samples.

[84] In NPR2, OFHEO noted that information was not available from Freddie Mac on the last-paid installment date for defaulted loans in the historical data used to estimate the model and that the date of disposition of a foreclosed property had been used for Freddie Mac's loans. The last-paid installment date was used for Fannie Mae, 64 FR 18174, April 13, 1999.

See also III.I.1.q, Summary of Changes in this section.

c. Mortgage Age

The single family default and prepayment equations proposed in NPR2 specified the age variable as a quadratic function—that is, each equation contained two continuous age-related variables, age and age-squared. MICA and GE Capital suggested that the proposed treatment of loan age results in the understatement of default rates on ''seasoned loans'' (loans outstanding for a year or more).[85] Using MICA data and extrapolating what they characterized as ''benchmark loss experience default rates for seasoned loans'' from information about the benchmark loss experience published in NPR1, these commenters inferred that the stress test default rates were understated relative to the benchmark loss experience, especially for high LTV loans, both ''seasoned'' and newly originated. They also pointed out that industry data shows conditional default rates remaining constant or even continuing to rise after a loan reaches 4.5 years of age, rather than conforming to the shape of a quadratic function. Two other commenters suggested that OFHEO use standard aging curves for mortgage default and prepayment in its stress test instead of specifying age as a quadratic function.[86] In contrast, Fannie Mae stated its belief that OFHEO's ''model should capture the relative performance of both (seasoned and unseasoned) loans.''

After considering the issue raised by the comments, OFHEO concluded that a categorical mortgage age variable would account for age-specific differences in conditional rates of defaults and prepayments in Enterprise data better than the continuous variables, age and age squared. Consequently, the final rule treats age as a categorical variable with nine age categories-six that correspond to each of the first six years of a loan's life (when defaults and prepayments tend to change rapidly) and three additional categories representing loans aged seven to nine years, ten to twelve years, and older than twelve years.

d. Relative Spread (Mortgage Premium Value)

In NPR2, OFHEO proposed to use relative spread—the difference between the coupon rate on a loan and the current market rate, divided by the coupon rate—as an explanatory variable in the prepayment equations. Relative spread is a proxy for ''mortgage premium value,'' the value to a borrower of the option to prepay and refinance. Mortgage premium value is an important factor in determining prepayment rates. When the borrower's rate is higher than the market rates, there is an incentive to prepay. OFHEO recognized in NPR2 that there is a theoretical basis for also using mortgage premium value as a variable in default equations. However, OFHEO did not include relative spread as a variable in default equations, but relied instead upon the burnout variable, which reflects whether a borrower has passed up an earlier opportunity to refinance at favorable interest rates, to measure the influence of interest rates on default.[87]

(i) Comments

Both Enterprises asserted that the proposed default equations do not adequately capture the influence of interest rates on the default rate, leading to an overstatement of losses in the up-rate scenario. According to the Enterprises, the proposed stress test does not capture the historically inverse relationship between interest rates and conditional default rates. That is, conditional default rates tend to decline in rising interest rate environments and rise in declining interest rate environments.[88] Neither Enterprise recommended the use of a mortgage premium value in the default equations, but both Enterprises asserted that failure to take the ''mortgage value effect'' into account resulted in an overstatement of credit losses in the up-rate scenario. Although they recognized that the burnout variable can partially explain why borrowers with loan rates higher than current market rates might be more likely to default than borrowers with loan rates lower than market, the Enterprises believe that the burnout variable does not adequately capture the relationship between defaults and changes in interest rates. As an alternative to using mortgage premium value as a variable in the default equations, Fannie Mae suggested that OFHEO specify an earlier and larger inflation offset or adjust up-rate default rates by a constant multiplicative factor of 0.7. Freddie Mac noted that precise measurement of mortgage value effect is very difficult in the extreme up-rate scenario of the stress test, but agreed that ignoring mortgage value effect resulted in very conservative default rates in the up-rate scenario.

(ii) OFHEO's Response

The inclusion of a mortgage premium value (relative spread) variable in default/prepayment models is consistent with a pure option theory of borrower behavior. In any month, borrowers can be thought of as having an option to default and an option to prepay. The decision to exercise or not exercise either of those options would depend partly on the mortgage premium value. The relevance of the mortgage premium value is based on an implicit assumption that a borrower would be able to replace the existing mortgage with a new one at current market rates. That assumption is generally justified in the case of prepayments, but not in the case of defaults. Accordingly, OFHEO decided not to include a mortgage premium variable in the default equation.

OFHEO disagrees with the Enterprises' view that the relationship between default rates in the two different interest rate scenarios is inappropriate. Those differences reflect the combined effects of very different prepayment rates and of different conditional default rates, which are affected by the burnout variable and the inflation adjustment to house price growth in the up-rate scenario. Each of these effects is properly measured, consistent with statutory requirements. The Enterprises' assertion that there are other ways that interest rates should affect default rates is not adequately supported. Any relationships between interest rates and default rates not accounted for by the factors that are incorporated in the stress test may reflect past correlations between interest rates and such factors as unemployment rates or underwriting practices (which OFHEO has determined should not be incorporated in the stress test) or correlations between interest rates and inflation rates in a way that is inconsistent with the specific provision of the 1992 Act describing how the relationship between interest rates and default rates should be accounted for.

[85] The commenters use the term ''seasoned'' as it is commonly used in the trade to mean loans that are not newly originated, rather than in the statutory sense of changes in LTV ratios over time.

[86] The commenters did not define ''standard aging curves.''

[87] *See* 64 FR 18132, April 13, 1999.

[88] Freddie Mac attributes this phenomenon to two factors: burnout and mortgage value. However, as Freddie Mac also points out, their separate effects are difficult to disentangle. Burnout refers to the adverse selection that occurs in a declining interest rate environment as many borrowers who can qualify for refinancing do so, leaving the remaining borrowers, many of whom cannot quality for refinancing because of poor credit or poor financial condition, with a higher conditional probability of default. In a declining interest rate environment the mortgage will have a premium value (relative spread will be positive). Borrowers who are able to prepay benefit from doing so, and those who are unable to prepay will have a higher conditional probability of default.

e. Burnout

The ''burnout'' variable reflects whether a borrower has passed up an earlier opportunity to refinance at favorable interest rates. It captures the tendency of the most responsive and creditworthy borrowers to prepay first, leaving a remaining sample of borrowers with a lower prepayment probability and higher default probability. The burnout function specified by OFHEO in NPR2 was a simple binary function; the borrower either missed prepayment opportunities over the prior eight quarters or did not.

(i) Comments

Commenters criticized the burnout specification as inadequate to capture the complex relationships between the current LTV, the economic environment, and the burnout phenomenon. In addition, commenters asserted that a binary function can cause large and sudden increases in conditional default rates on new loans in the quarter in which it is introduced, resulting in significant variability in the capital requirement. Fannie Mae attributed the sudden increases in conditional default rates to the combination of the binary function of the burnout variable and the large coefficient (weight) assigned to it. To remedy this, Fannie Mae suggested that the impact of burnout on defaults should be delayed until two years into the stress period and ''smoothed out'' by phasing in its effect over eight quarters. Still others recommended that OFHEO respecify the variable to phase in the burnout effects over a range of interest rates and over a longer period, eliminating the abrupt transition to burnout status that creates potential variability of the capital requirement.

(ii) OFHEO's Response

The final rule does not respecify the burnout variable over a range of interest rates or a longer period, or delay consideration of burnout until two years into the stress period, as suggested by commenters. The final rule does, for newly originated loans, phase in the effect of burnout once it is detected. Burnout is detected if the market rate is 200 basis points below the coupon rate in any two quarters out of the first eight quarters of loan life. Once burnout is detected, its effect is phased in over the first eight quarters after origination by multiplying the default and prepayment weights associated with burnout by an adjustment factor less than one. The adjustment factor is zero in the first two quarters of the loan's life, 25 percent in the third and fourth quarters, 50 percent in quarters five and six, 75 percent in quarters seven and eight, and 100 percent thereafter. For example, if rates drop by 200 basis points for the two quarters immediately after a loan is originated, that loan, if not prepaid, would be considered burned out in the third quarter of its life. Rather than applying the full effects of burnout suddenly, 25 percent of the default and prepayment weights associated with burnout would be applied in the stress test for those quarters corresponding to the third and fourth quarters of the loan's life, 50 percent in the fifth and six quarters of the loan's life, and so forth. This change will make the transition to burned-out status less abrupt for newly originated loans.

f. Occupancy Status

Occupancy status is used as an explanatory variable in the single family default and prepayment equations proposed by NPR2. However, the proposed stress test uses a single coefficient that reflects the average occupancy status across all loans, resulting in a specification that investor properties compose the identical fraction of all types of Enterprise mortgages, regardless of their characteristics.

This simplification was criticized by both Enterprises as not reflective of reality. They noted that investor loans have substantially lower LTV distributions than owner-occupied properties, and that 2–4 unit properties, which were assigned to the owner-occupied loan groups in the proposed regulation, exhibit characteristics more similar to investor properties. They suggested that OFHEO use occupancy status as a classification variable in forming stress test loan groups, use the coefficients estimated from the models or assign investor-owned properties a more appropriate multiplier, and allocate investor properties to their proper LTV categories. They also suggested that two-four unit properties and second homes be assigned to the investor-owned loan groups.

OFHEO did not adopt the commenters suggestion to use occupancy status as a classification variable because it would have doubled the number of loan groups and increased the time required to calculate the risk-based capital requirement significantly. However, the final rule responds to commenters' concerns by adjusting the model coefficient for each loan group by a fraction reflecting the actual percentage of investor-owned loans in that loan group, rather than using a single fraction reflecting the average occupancy status across all loans in the Enterprise portfolio. The final rule adopts the suggestion to assign 2–4 unit properties and second homes to the investor-owned percentage.

g. Season of the Year and Loan Size

One commenter noted that season of the year and loan size [89] were used as explanatory variables in the estimation of the model, but not in the stress test simulation, and that unemployment was not used as a variable in either. The commenter urged OFHEO to re-estimate the model without the season variable, include employment as a variable, and conduct further research on the relationship between loan size and probability of prepayment and default, stating that the size of the UPB has proved an important factor influencing the likelihood of prepayment.

As explained in NPR2,[90] season of the year and relative loan size were used in estimating the model but excluded in the simulations to achieve an average size and average seasonal effect. Using a specification for seasonality other than an average seasonal effect in the default simulation would have created quarterly volatility in default rates with no particular safety and soundness benefits. With respect to relative loan size, the models OFHEO estimated for NPR2 demonstrated that larger loans tended to have faster prepayment speeds, but the effect on default was small and inconsistent. Furthermore, loan size is not needed to make the distinctions required by statute. Weighing these factors, OFHEO concluded that using a specification other than average loan size in default simulations would have resulted in complexity not warranted by the additional benefit that would be derived.[91] Finally, OFHEO did not include the employment rate as an explanatory variable because the stress test includes only macroeconomic variables that are specified by the 1992 Act and employment rate is not among them. Furthermore, as noted in NPR2, the effect of macroeconomic variables such as unemployment are captured through the process of relating the stress test to the benchmark loss experience.[92]

In the course of testing different specifications of the re-estimated model, OFHEO found that these variables were

[89] OFHEO used relative loan size in estimating the model. Relative loan size is the ratio of the original loan amount to the average-sized loan purchased by the Enterprises in the same state and in the same origination year.

[90] 64 FR 18134–35, April 13, 1999.

[91] Including relative loan size as a classification variable would have resulted in a sevenfold increase in the number of loan groups.

[92] 64 FR 18135, April 13, 1999.

not statistically significant as predictors of default. Consequently, in the final rule, seasonality and loan size are not used in the estimation of the default equations. However, they remain significant predictors of prepayment and continue to be used in estimating prepayment equations. In the prepayment simulation, season of the year continues to be omitted to achieve average seasonal effect, but relative loan size is used as an explanatory variable to predict prepayment.

h. Relating Stress Test Default Rates to the Benchmark Loss Experience

Many commenters, including the Enterprises, asserted that the stress test overstates default rates on high-LTV loans; some commenters asserted that it also understates default rates on low-LTV loans. This effect was attributed to using a single calibration constant for all single family loans rather than calibrating each LTV category to the benchmark loss experience. One commenter suggested that a single calibration constant will result in an incorrect forecast of credit losses for any mix of business that differs from the mix in the benchmark loss experience cohort of loans. The commenters recommended calibrating to the benchmark loss experience by LTV category. In addition, Fannie Mae suggested that OFHEO adjust default rates on higher LTV loans to below those of the benchmark loss experience to reflect improved underwriting.

The final rule addresses the commenters' concerns by calibrating defaults to the benchmark loss experience by LTV category rather than using a single calibration constant. The benchmark default rates by LTV category to which stress test defaults are calibrated are set forth in Table 4.

TABLE 4.—ALMO BENCHMARK DEFAULT RATES BY LTV AT ORIGINATION

LTV Category	Default Rate
0 < LTV <= 60	2.2%
60 < LTV <= 70	3.5%
70 < LTV <= 75	7.9%
75 < LTV <= 80	9.4%
80 < LTV <= 90	16.4%
90 < LTV	26.4%

OFHEO did not adopt Fannie Mae's suggestion to adjust default rates on higher LTV loans to below the benchmark loss experience in order to reflect improved underwriting because, as explained in NPR2,[93] to do so would be inconsistent with the statutory direction to subject current books of business to the credit stress of the benchmark loss experience.

i. Adjustable Rate Mortgages (ARMs)

(i) Comments

Some commenters asserted that the proposed ARM default model is insensitive to payment shock and consequently understates defaults. ''Payment shock'' refers to the increased likelihood of default or prepayment when the interest rate on an ARM loan increases and the decreased likelihood of default or prepayment (sometimes called ''payment benefit'') when the interest rate decreases.

(ii) OFHEO's Response

OFHEO agreed with the commenters that adding a payment shock variable would enhance the ARM model. In the course of making this change, OFHEO discovered that a data issue needed to be addressed to remove a potential bias in the re-specified ARM model. Specifically, Freddie Mac has not been able to provide historical data with sufficient computational details (such as identification of the ARM index and rate or payment caps) for ARMs that defaulted or prepaid before 1995, and Fannie Mae has captured its historical data in such a way as to make the computational details for many of that Enterprise's ARM products difficult to model and in some cases ambiguous. The lack of computational detail in the available data results in an underrepresentation of ARM defaults and prepayments among records with these details. To address this issue, OFHEO has modified the treatment of ARM loans in the final regulation as described below.

The final rule respecifies the ARM model for default and prepayment rates as a multinomial logit model using an estimation dataset that pools 10 percent random samples of long-term ARM (original terms of more than 20 years) and 30FRM loans that were originated in the years 1979 through 1997 and acquired in the years 1979 through 1999. This methodology is similar to the methodology used to model 15FRM loans, balloon loans, and other single family mortgage products. This approach allows the sample to be drawn from all available data with no underrepresentation of defaulted and prepaid ARM loans.

The revised ARM model captures average differences in default and prepayment performance for ARM products relative to 30FRM loans while controlling for risk factors common to both types of loans. The respecified ARM model includes the same set of explanatory variables as the respecified 30FRM default and prepayment models, along with three additional variables (described below) unique to ARMs. Some of the explanatory variables common to both models, such as probability of negative equity, burnout, and relative spread, were approximated for ARM products because the information needed to replicate historical ARM coupon rate adjustments and mortgage payment adjustments was not available in the historical dataset. For example, the probability of negative equity was based on the UPB amortized as if the loan rate were fixed at the original rate, and relative spread and burnout were based on the differences between the original loan rate and the current market rate for 30FRM.

For these reasons, the effect on loan performance of subsequent ARM rate and payment adjustments is reflected in the respecified ARM model through the use of three additional explanatory variables unique to ARM products—a binary ARM product variable (which simply indicates whether the loan is an ARM product or not), a payment shock variable, and an initial rate effect variable (which captures the loan performance effects of ARM teaser rates in the first three years of a loan's life).[94] Computationally, the payment shock variable captures the effects of the interaction between the ARM product variable and relative spread. OFHEO believes that this serves as a reasonable proxy for payment shock. Similarly, the initial rate effect variable captures the interaction between the ARM product variable and the first three loan age categories, representing loan age up to 3 years. All three new variables are used in both the default and prepayment equations in the respecified ARM model.

Because the payment shock variable is defined in terms of the relative spread between the initial rate and market rate, the coefficients (weights) for the payment shock variable can be interpreted as ''ARM adjustments'' to the coefficients for relative spread estimated from pooled 30FRM and ARM data. Similarly, the coefficients for the initial rate effect variable can be interpreted as ARM adjustments to the first three age coefficients, which are

[93] 64 FR 18118–18119, April 13, 1999.

[94] Even when market interest rates are not rising, teaser rates (below market initial rates) can cause payment shock effects in ARMs as the low initial rate adjusts to the market rate.

also estimated from the pooled data. The ARM product variable coefficient can be interpreted as a fixed effect that further distinguishes ARM product performance from that of the pooled loans in the dataset.

All variables in the final ARM model were found statistically significant with reasonable interpretations for all variable weights. The initial rate effect, which captures teaser rate effects, shows an increase in the probability of default for ARMs during the first three years of the loan term relative to the remainder of the loan term. Finally, the payment shock variable predicts relatively higher ARM default and prepayment rates in an up-rate scenario as monthly payments rise, and relatively lower ARM default and prepayment rates in a down-rate scenario as monthly payments decline.[95]

j. Credit Scores

Several Wall Street firms commented that the failure of the default specification to take credit scores into account is inconsistent with the goal of the stress test and suggested that OFHEO elicit proposals from the Enterprises to incorporate credit scoring in the risk calculation. Other commenters, including one of the Enterprises, supported OFHEO's decision not to incorporate credit scores in its mortgage performance models at the current time, but suggested that OFHEO monitor the composition of mortgage credit scores to assure that OFHEO's default projections continue to reflect the credit quality of Enterprise mortgages.

The final regulation does not take credit scores into account. Although borrower creditworthiness is not among the loan characteristics required by the 1992 Act to be considered, as more data becomes available on the predictive validity of credit scores, OFHEO will consider whether credit scores can be taken into account in a way that would improve the stress test.

k. Additional Risk Characteristics

Some commenters suggested that the failure of the model to recognize the additional risk characteristics of loans such as subprime, ''Alternative A,'' manufactured housing, and home equity loans could result in inadequately capturing the risk in Enterprise portfolios if these types of loans comprise a significant portion of the portfolio. One commenter suggested adding a surcharge to the risk-based capital calculation for second mortgage lending and subprime lending because of higher levels of fraud and collateral valuation issues encountered in such lending.

The final regulation makes no changes in the proposed regulation to explicitly take into account unique features of such loans. However, when OFHEO determines that a loan has such unusual features or risk characteristics that it is essentially a different product from similar loans for which a treatment is specified, and that the specified treatment does not adequately reflect the risk to the Enterprises, the Director has the discretion to treat such loans as new activities subject to section 3.11, Treatment of New Enterprise Activities, of the Regulation Appendix.

l. Aggregation of High LTV Loans

The proposed stress test groups all loans with LTVs over 90 percent into the same LTV category. One commenter stated that this aggregation resulted in a prepayment rate that is too high for the category and suggested that distinctions should be made among 95 percent, 97 percent and over 97 percent LTV loans. The final regulation does not adopt this suggestion because there are too few observations of over 90 percent LTV loans in the historical database to construct a reasonable model for these high-LTV loans. In developing the stress test OFHEO sought to achieve a balance between operational workability and precision. Striking such a balance necessarily involves some grouping of sparsely populated categories. When more data become available, OFHEO will consider making finer distinctions.

m. Structured Mortgages

The proposed stress test does not differentiate between a first mortgage made coincident with a second lien (together, a structured loan) and one without. A number of commenters noted that failure to distinguish loans based on this characteristic understates the true credit risk and thus understates the required capital for structured loans.[96] Commenters suggested that the default frequency for structured mortgages should be based on the current LTV of the combined loans.[97] However, Freddie Mac argued that, given current industry data practices, there is no reliable way to distinguish an 80–10–10 mortgage[98] from other 80 percent LTV mortgages and that the increased credit risk of 80–10–10 loans is offset by improvements in credit scores and other credit risk factors.

OFHEO recognizes that there may be a risk distinction between a first mortgage on a property that is also subject to a second lien mortgage and one that is not. However, modifying the stress test to capture that additional risk would require that the Enterprises be able to identify those first mortgages that are also subject to a second lien. Currently, the Enterprises are unable to do that in all cases. Although no change has been made in the final regulation to respond to the concern, OFHEO will require the Enterprises to collect combined current LTV information for structured mortgages to analyze for possible use in future modeling.

n. Product Categories

The Other Fixed-Rate Products Model proposed in NPR2 included five categories of mortgage products to distinguish their different risk characteristics—20-year fixed-rate mortgages, 15-year fixed-rate mortgages, balloon loans, Government loans, and second lien loans. However, in the re-estimation of the Model, OFHEO found that the inclusion of the second lien loans as a separate product category caused the coefficients associated with the 20-year fixed-rate mortgages and the 15-year fixed rate mortgages to be statistically insignificant. As a result, OFHEO eliminated the second lien data from the re-estimation. In the stress test, loans with the second lien product code will be assigned the coefficient weights from the Other Fixed-Rate Products Model, using the government loan coefficient weight for government loans and the balloon loan coefficient for non-government loans. In addition, certain fixed-rate mortgage products with variable payments over time (such as graduated payment mortgages and growing equity mortgages) are no longer treated as ARMs as they were in NPR2, because they are not affected by changes in market interest rates. Like other non-standard fixed rate products, these loans, many of which are past their scheduled payment adjustment periods,

[95] These effects are relative. For example, the model predicts ARM prepayments will rise during a down-rate scenario, but not by as much as 30FRM prepayments are predicted to rise in the same scenario.

[96] Under NPR2, the first mortgage of a structured loan is treated as an 80 percent LTV loan without taking into account the second lien loan. However, in modeling the second lien loan, the stress test takes into account the existence of the first lien loan and assigns the second lien loan the combined LTV. The commenter's suggestion implies that because the first mortgage is not also given the combined LTV, the capital requirements for the structured loan are understated.

[97] The comment implies that the first lien mortgage should also be assigned the combined LTV.

[98] An 80–10–10 loan is a loan with an 80 percent LTV first mortgage, a 10 percent LTV second lien, and a 10 percent down payment.

are assigned the balloon loan coefficient weight.

o. Prepayment Rate Levels

(i) Comments

A number of commenters, including the Enterprises, stated that the stress test produces unreasonably low prepayment rates in the up-rate scenario. One commenter suggested that, based on the commenter's analysis of historical data, prepayment speeds in the up-rate scenario should be roughly double those proposed by OFHEO. The commenter attributed the difference to factors that OFHEO may not have taken into account, such as the nonassumability of conventional mortgage loans since 1985 and the long-run positive correlation of home price inflation with rising interest rates. As a result, the commenter supported a conservative prepayment speed assumption of 100–120 PSA [99] or 6–7 CPR [100] in the up-rate scenario or, alternatively, the adoption of a specific prepayment rate for the up-rate scenario. Other commenters argued that prepayment speeds in the up-rate scenario were implausible because termination rates (prepayment rates plus default rates) would be below historical mobility rates.

Some of the commenters attributed the low prepayment rates in the up-rate scenario to the fact that the data used to estimate the model are from a period when mortgage assumptions were common and interest rates were generally falling. Hence, the commenters argued, the data used are not representative of the mortgages currently owned by the Enterprises (and, therefore, presumably insufficient to establish prepayment rates for the up-rate scenario). These commenters suggested that OFHEO calibrate prepayments to the benchmark loss experience and adjust the prepayment rates upward in the up-rate scenario to reflect the introduction of due-on-sale clauses in Enterprise mortgages and to be more consistent with results from homeowner mobility studies. One commenter noted that historical parameters will underestimate prepayments in the future because technological improvements have reduced the cost and inconvenience of rewriting and prepaying loans and suggested that OFHEO correct for the underestimation. Some commenters thought that prepayment rates in the down-rate scenario were too high, and some thought they were too low. Freddie Mac thought prepayment rates in the down-rate scenario were reasonable, noting that OFHEO's probability of negative equity variable dampens the effect of large refinancing incentives by capturing the effects of the falling house price environment in the down-rate scenario and that prepayment rates for loans with high original LTVs in falling house price environments will be far lower than those of low LTV loans in good house price environments.

Two commenters noted that the stress test does not produce prepayment rates for the benchmark cohort that match actual historical rates. One of those observed that the stress test produces prepayment rates that are significantly higher than the mortgage industry experience for the benchmark region and time period. The other commenter noted that it is important for prepayment speeds not to be overstated in the down-rate scenario or understated in the up-rate scenario because the linkage of default and prepayment characteristics associated with the joint modeling approach may ''inadvertently magnify the dollars at risk.'' The commenter suggested further study of this issue. Another commenter suggested that prepayments in the stress test should be calculated based upon house prices growing at normal historical levels, rather than using the house price path of the benchmark loss experience.

(ii) OFHEO's Response

The final rule does not adopt the commenters' recommendations for modifying the prepayment equations. Implicit in a number of these comments is a belief that patterns of prepayment, like patterns of defaults and losses, should be consistent with those of the benchmark loss experience. However, the 1992 Act only requires that defaults and loss severities be consistent with those of the benchmark loss experience. Characteristics of the stress period other than those specified by the statute, ''such as prepayment experience and dividend policies'' are to be determined by the Director ''on the basis of available information, to be most consistent with the stress period.[101] OFHEO's approach, which reflects prepayment patterns based on all available historical data, is appropriately conservative. OFHEO believes that, in order to represent the interest rate risk of the Enterprises realistically, the stress test simulation of prepayments should reflect overall historical prepayment patterns rather than reflecting only borrowers' prepayment behavior associated with the benchmark loss experience. Historical patterns have evolved over time and take into account more recent patterns of prepayment, which are more sensitive to interest rate changes than the prepayments of the benchmark loss experience.

With respect to concerns about low prepayment speeds in the up-rate scenario, OFHEO believes that scenario represents an unprecedented combination of events—a severe nationwide recession combined with high interest rates. Borrowers would have no incentive to prepay unless they moved, but mobility rates would be unusually low. The cost of switching to a mortgage with a much higher interest rate would greatly discourage moving, and limited job availability would provide little incentive. Similar conditions, though on a lesser scale, occurred nationwide during the early 1980s. Turnover rate estimates provided by Salomon Smith Barney in its comment show an average annual rate of 4.3 percent in 1981–1983. Given the more severe conditions in the stress test, the slightly slower prepayment speeds generated by the stress test model are quite reasonable.

Similarly, the commenter's concern about data incorporating assumable loans is misplaced. The Enterprises' historical data from before 1986 is a relatively small portion of the overall dataset because comparatively few loans were purchased from those origination years, and the Enterprise data are incomplete. Furthermore, mortgage rates in the early 1980s were unusually high, so assumability would not have had a large effect on prepayment. The dataset contains few loans originated in 1979. Any small effect on the results may be offset by the unavailability of ARM and balloon loans in the early origination years. Borrowers who expect to prepay more often select these loan types, which tends to lower prepayment rates on 30-year fixed-rate loans, but that effect is absent from early loan data.

p. Seasoned Loan Purchases

The stress test proposed in NPR2 made distinctions among loans based on their age through the age variables and their changes in LTVs (by amortizing mortgage balances and updating property values), but made no distinction between loans purchased or guaranteed by an Enterprise shortly after their origination, and loans purchased or guaranteed after having been held for a period of time by the originator.

Freddie Mac criticized the lack of distinction between loans purchased or

[99] This measure of prepayment speed is derived from the prepayment model of the Public Securities Association, (PSA), which is an industry standard for measuring prepayment speeds.

[100] CPR refers to ''conditional prepayment rate,'' a commonly used method of expressing prepayment speeds on an annualized basis.

[101] 12 U.S.C. 4611(b)(2).

guaranteed just after origination and ''seasoned purchases,'' (loans purchased or guaranteed when they are at least 12 months old). Freddie Mac stated that its ability to screen loans with ''substandard performance'' from seasoned purchases lowers their risk relative to loans purchased near the time of origination and suggested that OFHEO identify seasoned purchases as a separate category and, ''based on analysis,'' reduce their defaults in that category by 30 percent relative to loans having otherwise similar characteristics.

In the absence of any empirical evidence that a reduction in default rates is appropriate for seasoned loan purchases, and in view of the increased complexity that would result from adding another data element, the final rule does not adjust default rates downward for seasoned loan purchases. However, should credible evidence become available in the future that demonstrates that there is a significant difference between the default rates for seasoned loan purchases and the default rates for newly originated loan purchases, OFHEO will consider whether the additional complexity that would result is warranted.

q. Summary of Changes

In the final rule, the following changes are made to the proposed single family default and prepayment models:

- The models are reestimated using a more recent and complete dataset.
- A categorical age variable replaces the continuous age and age squared variables
- Investor-owned fractions are calculated for each loan group and used to adjust the investor-owned coefficient.
- Season of the year and relative loan size are dropped as explanatory variables in the estimation of default equations.
- Default rates are calibrated to the benchmark loss experience by LTV category.
- The ARM model, which has been respecified and reestimated on a data set of pooled 30FRM and ARM loans, captures the average effects of payment shock and other performance factors relative to 30 FRM loans while controlling for risk factors common to both types of loans.

2. Single Family Loss Severity

NPR2 proposed to calculate loss severity during the stress period as a percentage of the defaulting principal balance at the time of loan default. Three components of loss severity were considered—loss of loan principal, transactions costs, and funding costs. Loss of loan principal is the Real Estate Owned (REO) sale price less the loan balance, based on normal loan amortization, at the time of default. Transactions costs comprise foreclosure/legal costs, property holding and disposition costs, and for sold loans, four months of interest at the security pass-through rate. Funding costs, the Enterprises' cost of funding a loan between the time of default and sale of the foreclosed property, were captured by discounting all costs and revenues based on time of receipt during the foreclosure/REO disposition process.

NPR2 proposed an econometric model to estimate loss of loan principal, fixed parameters for transactions costs and time intervals for determining funding costs, and funding rates based on stress period interest rates. The econometric model, estimated using all available historical data for loans entering REO status, calculates the loss of loan principal as a function of median house price appreciation rates reflected by the HPI, and house price volatility. The model includes a single calibration constant, to produce results consistent with the ALMO benchmark loss experience.

In the proposed stress test, property holding and disposition costs and foreclosure/legal costs are based on averages from all available data on Enterprise REO properties. The four months of loan interest the Enterprises must pass through to MBS investors for defaulted loans is calculated at the MBS passthrough rate. Funding costs are determined by discounting all loss severity elements by the six-month Federal Agency Cost-of-Funds rate to produce the present value of each element in the month of default. The time intervals used in the discounting process are based on benchmark REO loans.

a. Comments

Commenters criticized the complexity of the proposed methods for calculating the loss of loan principal and funding costs, the fact that the approach did not consider pre-1987 Fannie Mae loss severity data, the calibration of the loss of loan principal rates to the benchmark loss experience using a single constant term rather than by LTV category, and the inconsistent treatment of the components of loss severity in their relationship to the benchmark loss experience. (Only loss of loan principal and the timing of loss severity revenues and costs were based on the benchmark loss experience.)

The Enterprises suggested that OFHEO extract loss of loan principal estimates and funding costs directly from the benchmark loss experience and use those in the stress test. They suggested (1) extracting loss severity rates for three LTV ranges directly from the benchmark loss experience, (2) subtracting from the resulting loss rates benchmark funding costs, (3) making adjustments for pre-1987 Fannie Mae REO data (which Fannie Mae has only recently made available), (4) adding back new fixed funding costs (rather than using the present value approach used to identify the benchmark loss experience) based on the interest rate scenario (down- or up-rate) and relative LTV, and (5) make specified adjustments for loan age and product type, also considering LTV.

GE Capital and MICA criticized OFHEO's approach to loss severity in the context of broader concerns about stress test mortgage losses being lower than those implied by the ALMO benchmark loss experience, inconsistency between loss rates in the up- and down-rate scenarios, and the offsetting of some credit stress by interest rate stress. To eliminate concerns about inconsistency between the interest rate scenarios and the offsetting of credit stress by interest rate stress they proposed an approach to loss severity rates that would be insensitive to differences in the two interest rate scenarios. To address concerns about overall mortgage losses, they proposed using LTV category-specific calibration constants in the econometric model. They proposed a calibration process that substituted the Moody's AAA regional home price decline and an alternative interest rate path for the benchmark house price and interest rate paths. Details of their proposal for mortgage performance modeling are summarized earlier in III.I.1.a., Modeling Approach.

b. OFHEO's Response

Upon review of the approach included in NPR2 and the related comments, OFHEO determined that the modeling of loss of principal balance could be greatly simplified. While the final regulation does not adopt the commenters' specific suggestions, it modifies the calculation of loss of loan principal and reduces its variability.

Rather than using an econometric model to estimate loss of loan principal calibrated to the benchmark loss experience, the final rule specifies loss of loan principal as a function of median house price appreciation rates reflected by the HPI, and the average ratio of actual sale prices of benchmark REO to values based on projected HPI changes. The final rule eliminates use of the HPI volatility parameters, and since it directly relates loss of loan principal

to the benchmark loss experience, requires no model calibration.

The final rule continues to apply the present value approach proposed in NPR2 to determine funding costs. OFHEO does not agree that funding costs should be fixed, since they would not be consistent with the widely varying interest rate conditions associated with the two stress test interest rate scenarios. OFHEO believes the funding costs should be directly determined by stress test interest rates.

The final rule continues to apply NPR2 approaches to transactions costs and the time intervals used to determine funding costs. However, as a result of including previously unavailable Fannie Mae data on foreclosure costs in the calculation of average historical REO holding and disposition costs, the average foreclosure costs decreased from 5 percent to 3.7 percent and the REO holding and disposition costs increased from 13.7 percent to 16.3 percent.

As discussed earlier in III.I.1.a., Modeling Approach, the 1992 Act contemplates stress test results that reflect the interaction of interest rates with mortgage performance. OFHEO believes the differences in mortgage performance in the two stress test interest rate scenarios are consistent with the 1992 Act.

3. Multifamily Loan Performance

NPR2 utilized two multifamily default models and five multifamily prepayment models to capture the behavior of loans purchased under different programs and at different stages in their life cycles. The models were estimated using historical data through 1995 on the performance of Enterprise multifamily loans. NPR2 proposed one default model for ''cash'' programs and another for loans acquired under ''negotiated'' transactions (NT loans). The proposed prepayment models allowed for appropriate distinctions between fixed- and adjustable-rate loans, between fully-amortizing and balloon loans, and between loans that are within yield maintenance or prepayment penalty periods (i.e., periods during which restrictions and/or penalties for prepaying a loan apply) and those that are not. The models also provided for some balloon loans to survive beyond their stated maturity dates. All of the multifamily default and prepayment models were estimated with historical rent and vacancy rates. Simulations were based upon rates in the ALMO benchmark loss experience to create stress test conditions. To determine loss severity on multifamily cash loans, NPR2 used average cost and revenue components from all historical multifamily real estate owned (REO) from which severity data was available, which consisted of Freddie Mac loans originated in the 1980s. On NT loans that included repurchase agreements, the loss severity rate was set at an historical rate adjusted for the seller/servicer claim rate on 90-day delinquent loans and was set on FHA loans at three percent of UPB.

a. Multifamily Default Model

The proposed rule used the following variables to determine default rates in the cash model: [102]

- Joint Probability of Negative Equity and Negative Cash Flow—Used to capture the probability of a particular loan incurring concurrent negative cash flow and negative equity.
- Mortgage Age and Age Squared—Used to capture change in the risk of default as loans age.
- Program Restructuring—Used to capture difference between default risk of original multifamily programs and current, restructured programs.
- Balloon Maturity Risk—Used to capture the added risk of default as the balloon maturity date approaches.
- Value of Depreciation Write-offs—Used to capture effect on default rates of the value of certain tax benefits.

Many commenters addressed the methodology proposed to calculate multifamily loan defaults. Some of these comments expressed concern that the multifamily default levels not be so high as to impact negatively upon the Enterprises' low income housing programs and their ability to meet housing goals. Other comments viewed the multifamily model as insufficiently stressful and suggested major modifications to avoid creating perverse incentives and anomalies in the final rule. Others suggested that the proposed rule should take into consideration the differences between Fannie Mae's Delegated Underwriting and Servicing (DUS) loans and loans from other programs. A significant number of comments also discussed the appropriateness of specific variables proposed to determine default rates. These comments and OFHEO's responses are summarized below by topic.

(i) Negative Equity and Current LTV Variables

A primary concern of numerous commenters was the methodology in the proposed rule for updating property values from loan origination through the stress period, which affected the Joint Probability of Negative Equity and Negative Cash Flow variable (JP) and its balloon-maturity counterpart (BJP). The model established current property values by projecting the net operating income of each property and capitalizing these cash flows to project price changes for the collateral properties. The capitalization rates that were used to determine property values were based upon ten-year constant maturity Treasury yields.

Commenters criticized this method of capitalizing the net operating income as inappropriate for a number of reasons. Some commenters suggested it resulted in large increases in property values in the down-rate scenario in contrast to the commenters' historical experience. Some commenters argued that any realistic capitalization rate model should take into consideration numerous factors other than current interest rates, such as local housing inventory and the marketability of particular neighborhoods. Furthermore, commenters were concerned that the proposed methodology incorporates implicit assumptions about economic parameters (such as variance, covariance and distribution of rents, vacancy rates and property values) that were untested, but had significant impact on default rates. Largely as a result of these concerns about the capitalization rate model, all commenters to address the issue suggested that OFHEO find an alternative to the JP variable.

After considering these comments and further analyzing the NPR2 approach, OFHEO decided to eliminate the calculation of the probability of negative equity from the multifamily model, thereby eliminating the JP and BJP variables and the need to update property values throughout the stress test. OFHEO concluded that the capitalization rate estimation proposed in NPR2 was not sufficiently robust, given the significant impact it could have on multifamily default rates. Because the probability of negative equity comprised part of the JP and BJP variables, those variables could not be used and the model in the final rule replaces JP and BJP with variables related to property cash flow, property value, and balloon risk.

The first of these variables is the natural logarithm of the current debt-service-coverage ratio (current DCR).[103]

[102] Because the NT model has been dropped from the final rule, it is not described. *See* 64 FR 18136–18139, April 13, 1999, for a description.

[103] OFHEO used the log transformation on DCR and LTV to capture the non-linear effects of these variables. In other words, the incremental effect on the risk of default of a change in DCR (LTV) was

Current DCR is the ratio of the net operating income on the property to the debt-service payments. Current DCR is updated in essentially the same way as in NPR2 but with a newly-constructed rent and vacancy rate series. The second is an Underwater DCR indicator variable (UDCR), which indicates that property cash flow is negative because current DCR has declined below 1.00. The third is the natural logarithm of LTV at loan origination or, if origination information is unavailable, at Enterprise acquisition (LTV).[104] The fourth is a balloon maturity flag or indicator (BM) that indicates a balloon loan within twelve months of maturity.

In combination, current DCR, UDCR, and LTV capture essentially the same mortgage performance factors the JP variable was designed to capture—the effects of negative equity and negative cash flow on default probability. Current DCR captures the expected inverse relationship between debt-service-coverage ratio (net operating income relative to mortgage payment) and default risk. Larger surpluses of net operating income over the amount required to service debt represent larger borrower cushions to weather possible increases in vacancy rates arising from stressful economic conditions, such as the stress test. UDCR captures the additional risk of default when current DCR is negative. LTV captures the lower risk of default associated with greater borrower equity early in the life of the loan. Larger amounts of borrower equity at origination or acquisition appear to serve as a cushion in delaying possible negative equity in situations of property value deterioration caused by any number of primarily local or regional phenomena.[105]

The fourth variable, a balloon maturity flag or indicator (BM) has taken the place of the BJP variable. It captures additional risk of default, resulting primarily from the borrower's inability to refinance during the twelve months prior to balloon maturity. In the final rule, conditional default rates reflect higher risk in the twelve months prior to balloon maturity as a result of the balloon maturity flag, but balloon loans are not extended at maturity as they were in NPR2.[106] Although OFHEO realizes that the Enterprises commonly permit balloon term extensions to qualified borrowers, particularly when the market rate of interest exceeds the original note rate and a reversal of the rate trend is expected in the short term, OFHEO also finds it inappropriate to model this practice in the stress test given the restrictions on new business imposed by the 1992 Act. Accordingly, and consistent with the procedure for single family loans, in the final rule, multifamily balloon loans which mature during the stress test will pay off at maturity.

OFHEO determined that the definition of the term ''seasoning'' in the 1992 Act must be applied differently to multifamily loans than to single family loans.[107] The definition appears to have been crafted to apply only to single family loans, because it defines ''seasoning'' as the change in LTV of mortgage loans based upon changes in a specific single family house price index or another equivalent index of OFHEO's choosing. At this time, there are no indexes of multifamily property values available that meet the standards of quality, authority, and public availability in the 1992 Act. Therefore, in NPR2, OFHEO defined an equivalent index of multifamily property values imputed from existing rental and vacancy indexes in combination with the capitalization rate model discussed above. However, OFHEO is now persuaded by the commenters not to use this approach. Accordingly, the final rule does not attempt to adjust LTV for multifamily loans directly as it does for single family loans. Rather, to account for differences in seasoning among multifamily loans, the stress test updates DCR over time.

The seasoning requirements of the 1992 Act are intended to require OFHEO to take into account the impact of changes in the housing market on mortgage losses.[108] Congress recognized that changes in house prices, as measured by widely available and reliable indexes, provide an important measure of the direction of the single family housing market. However, the 1992 Act also requires OFHEO to take into account differences in types of mortgage loans,[109] and applying single family seasoning to multifamily loans would not take into account the important differences between these loan types. Because multifamily loans are commercial rather than residential loans, updating property DCR provides a good measure of the impact of changes in the multifamily housing market (and, therefore, of ''seasoning'') on multifamily defaults. Therefore (and in contrast to single family lending, where DCR is not applicable), in multifamily lending, change in DCR is the most direct determinant of the continuing viability of a loan.

OFHEO has determined that the intent of the statute to take both seasoning and product differences into account is best effected as to multifamily loans by updating DCR through the stress period using the government indexes that best represent rent growth and vacancy rates from the ALMO benchmark region and time period.

(ii) Use of Actual Debt-Coverage Ratio

The Enterprises commented that OFHEO should use actual data on income and expenses from annual operating statements along with mortgage-payment information to establish the DCR of multifamily properties as of the start of the stress test. OFHEO agrees that actual data is preferable to the process proposed in NPR2 of updating origination DCR using historical rent growth and vacancy rates to impute net operating income as of the start of the stress test. The final rule is modified accordingly. Thus, for multifamily loans that have property-level operating statements, the most recent available actual net operating income figures from these statements will be divided by the current mortgage payment and the resulting DCR will be reported in the Risk-based-capital Report, to be used to establish DCR immediately prior to the stress period.

For properties for which the Enterprises at present lack annual operating statements, the stress test uses origination DCR as DCR immediately prior to the stress period. If origination data is also lacking, the stress test uses acquisition DCR as DCR immediately prior to the stress period. If both origination and acquisition data are lacking, the final rule specifies a DCR immediately prior to the stress period of 1.10 for Old Book loans and 1.30 for

found to be greater at low DCR (high LTV) than at high DCR (low LTV).

[104] *See supra* note 103.

[105] For loans missing origination LTV, acquisition LTV is used. If both are unavailable, 80 percent and 90 percent, respectively, are used for New Book and Old Book loans. These figures represent the mean origination/acquisition LTV of loans with such data.

[106] In NPR2, loans already past their maturity dates at the start of the stress test were extended three years and loans not yet past their maturity dates at the start of the stress test were extended five years. In both cases, the remaining loan balance was amortized at the then-current market interest rate over the original amortization term.

[107] The 1992 Act defines ''seasoning'' at 12 U.S.C. 4611(d)(1). The Act provides that ''the Director shall take into account * * * differences in seasoning of mortgages * * * the Director considers appropriate.'' 12 U.S.C. 4611(b)(1).

[108] 12 U.S.C. 4611(b)(2).

[109] ''[T]he Director shall take into account appropriate distinctions among types of mortgage products * * * the Director considers appropriate.'' 12 U.S.C. 4611(b)(1).

New Book loans.[110] OFHEO anticipates that these treatments are sufficiently conservative to cause the Enterprises to begin collecting accurate DCR data on all multifamily loans for which it is possible to do so. If OFHEO finds these treatments not to be sufficiently conservative for that purpose, it will reconsider the appropriate DCR levels for loans with missing DCR data.

(iii) Age and Age Squared Variables

Only the Enterprises commented directly upon the inclusion of the two age variables, age and age squared, in the default model. Although neither Enterprise recommended specifically that these variables be eliminated from the model, neither included them in its list of recommended variables. Freddie Mac suggested that the age variables are likely substituting for other variables or capturing measurement problems and are unlikely to be related to the aging effects that they are intended to capture. Fannie Mae commented that the age variables increase default rates to an unexpected degree. As an example, Fannie Mae suggested that a 13 percentage point difference in ten-year default rates is too great between a cash 80 percent LTV, 1.25 DCR, 15-year, balloon loan that is newly originated and the same loan that is four years old.

OFHEO disagrees with the Enterprises' criticisms of the age variables and has retained them in the multifamily model because they are highly reliable predictors of default. Additionally, they reflect the pattern of actual defaults in Enterprise data (defaults increase at a decreasing rate with loan age). OFHEO recognizes that the significance of the age variables in the multifamily default model may be substituting for omitted or mismeasured variables. However, there also is evidence that the aging effect may be a credible discriminator of default risk in and of itself.[111] The lack of detailed and consistently measured operating statement and property condition data render further investigation of the underlying reasons for the significance of the age variables on multifamily default risk difficult.

(iv) Operating Expense Ratio

NPR2 calculated DCR with expenses as a fixed share (47.2 percent) of the gross potential rents. Fannie Mae commented that a fixed expense ratio increases the volatility of net operating income and recommended that OFHEO modify the constant expense factor to reflect the reality that the components of property level operating expenses are not all fixed shares of gross income. Fannie Mae suggested that OFHEO reflect this mixture either by reducing the change in net operating income in response to a change in vacancy rates or by utilizing actual net operating income values from the annual operating statements Fannie Mae receives on multifamily loans.

After consideration of these comments, OFHEO concluded, from both the literature and the limited availability of data, that neither of the Fannie Mae approaches should be accepted. OFHEO recognized that property level operating expenses and its components may not remain fixed shares of gross rents over time. However, OFHEO is unsatisfied with current approaches and data available for modeling the inflation in multifamily property expenses and its components. One study divided operating expenses into four fixed-share components—labor costs, utilities, insurance and taxes, and construction materials—and modeled growth in each with indexes that would reflect the inflation in each component.[112] Property-level variances around the mean were also measured, the author concluding that it would be surprising if operating expenses varied from one year to the next by amounts as large as those observed. Other approaches to modeling property level operating expenses or its components would have required the use of simplifying assumptions that cannot be tested regarding component shares of total operating expenses and related indexes approximating respective growth rates. OFHEO has found insufficient evidence that any of these methods provided improved estimates over the NPR2 approach.

OFHEO also considered Fannie Mae's suggestion to use actual observations of net operating income from the Enterprises, where available, to estimate the model. OFHEO found this suggestion unpersuasive because the percentage of loans with annual DCR in the estimation dataset was just 14 percent. In terms of observations for each year in the life of each loan, the percentage of records with annual DCR dropped to 9.7 percent, with very few of those having three or more consecutive annual DCR observations (3.7 percent of total loan-year records). Further complicating the estimation process was the fact that annual DCRs are not calculated by the Enterprises in the same way as are origination/acquisition DCRs. While the Enterprises typically calculate the latter using conservative assumptions of vacancy rates, rental and other income, expenses, replacement reserves and the like, the former represent actual data from operating statements, unadjusted for normal variations from year to year or deviations from market rates. In sum, the data were too sparse and dissimilar for use in constructing a reasonably robust model.

Accordingly, in estimating the multifamily default model for the final rule, OFHEO utilized the NPR2 expense constant for all loan observations and did not use Enterprise actual net operating income to update DCR for estimation purposes.

(v) Use of Two Default Models

Both Enterprises commented upon OFHEO's proposal to use two default models, one for negotiated transactions (NT) and one for cash purchases. Freddie Mac recommended that the distinction between the two categories of loans be dropped because it is too difficult to define, explaining that Freddie Mac was unable to replicate the classification of its own loans that OFHEO used in NPR2. Fannie Mae echoed these comments, targeting the NT equation, in particular, as poorly specified and not a useful guide to multifamily loan performance. No comments were received supporting the use of two default models. However, both Enterprises and several other commenters supported the general concept of distinguishing between multifamily programs or regimes in the stress test. All commenters on the subject concurred that the underwriting and servicing practices of the Enterprises underwent major and permanent changes beginning in 1988 (Fannie Mae) and in 1993 (Freddie Mac), which should be reflected in the stress test. Comments from seller/servicers of the Enterprises urged OFHEO to give credit for improvements in multifamily loan management in order to avoid imposing inappropriately large marginal capital costs on this portion of the Enterprises' business. In addition, seller/servicers in Fannie Mae's DUS program suggested that DUS loans get special treatment to reflect what they felt were more rigorous guidelines, loss-sharing provisions, and reserve and reporting requirements in that program.

In considering the need for two default models, OFHEO studied the changes in the Enterprises' multifamily businesses, analyzed the comments, and conducted additional modeling research

[110] New Book and Old Book loans are discussed *infra,* 3.a.v., Use of Two Default Models.

[111] Edward I. Altman, ''Zeta Analysis and Other Attempts to Classify and Predict Business Failures,'' *Corporate Financial Distress and Bankruptcy: A Complete Guide to Predicting and Avoiding Distress and Profiting from Bankruptcy* (1993).

with recently provided data that is far more complete than that previously provided.[113] OFHEO concluded that the distinction between NT and cash purchases was no longer sufficiently important to require two models. Accordingly, OFHEO has replaced the two-model approach with one multifamily default equation that distinguishes between the performance of loans with indicator variables that apply a multiplier to adjust the loans' relative default rates.

One of these indicator variables, the New Book Flag (and its product adjustment factors, the New ARM Flag and the New Balloon Flag), like the program restructuring variable in NPR2, distinguishes loans acquired in 1988 and after at Fannie Mae and in 1993 and after at Freddie Mac (New Book loans) from loans acquired earlier (Old Book loans). It reflects the fact that during 1988 and 1993, Fannie Mae and Freddie Mac, respectively, implemented significant permanent changes in their methods and standards for underwriting and servicing multifamily loans. Loans acquired after these dates that constitute defensive refinances of Old Book business remain classified as Old Book. The New Book Flag has a greater impact on default rates than the NPR2 program restructuring variable, due to use of additional data in estimating the model and the decision to eliminate the adjustments to Old Book loan LTVs and DCRs that are used in NPR2.[114]

In re-evaluating the performance of multifamily New Book versus Old Book loans, however, OFHEO discovered that the full effect of the New Book benefit applies only to fixed-rate fully amortizing loans. For ARMs, the reduction in New Book default risk is significantly less than for New Book loans in general. Likewise, but to a lesser extent, fixed-rate balloon loans do not exhibit the full effect of reduced New Book default risk. These effects are reflected in the multifamily default model.

The other program indicator variable, the Ratio Update Flag, is used to identify newly originated loans and seasoned acquisitions on which DCR and LTV have been updated using conservative measures such as market-rate minimum vacancy rates, minimum actual historical other income, forward-looking trended expenses, and minimum replacement reserves, management fees, and capitalization rates.[115] After re-calculation of DCR and LTV, the Enterprises screen these loans for minimum acceptable DCR and maximum acceptable LTV ratios for purchase or securitization. OFHEO found that New Book loans that were subjected to the aforementioned type of ratio update process performed better than those that were not. Loans with neither origination nor acquisition DCR are treated as not having undergone the ratio update process.

(vi) Tax Reform and the Depreciation Write-off Variable

No commenters objected directly to the Depreciation Write-off variable (DW) but, for a number of reasons, OFHEO found it inappropriate for the multifamily default model in the final rule. First, the capitalization rate model, which was criticized by commenters in conjunction with the Joint Probability of Negative Equity and Negative Cash Flow variable (JP), was also used to construct the return on equity portion of the weighted average debt and equity discount rate in the DW variable. Because OFHEO decided to drop the JP variable from the multifamily default model, largely because of concerns about the capitalization rate model, it would have been inappropriate to retain the DW variable. Second, the available data on value of depreciation write-offs suffered from the same lack of regional and sub-market variation criticized in the capitalization rate model.[116]

(vii) Use of External Benchmarks

Several commenters asked OFHEO to allow external benchmarks and industry standards to serve as tests of reasonableness for the multifamily model results until sufficient reliable data become available to build a more sensitive and detailed model. In most cases, OFHEO agrees with the commenters that external benchmarks and industry standards may be used for assessing the reasonableness of multifamily stress test default rates. For this reason, OFHEO has compared its simulated stress test results with those provided by the Enterprises in their comments and consulted rating agency and related analyses. However, there exist far fewer studies of the determinants of multifamily default than single family default. Still fewer studies analyze defaults under stressful economic conditions—and none examines multifamily defaults through a period of time as stressful as the stress test. Notwithstanding these limitations, OFHEO found that for fixed-rate loans both of these avenues provide confirmation that OFHEO's model results are reasonable.

For multifamily ARM default rates, however, there are no studies involving stressful economic environments that OFHEO found of adequate quality and authority to be useful for comparison. For these loans, OFHEO looked to whether the default rates on the loans appear reasonable, given their extreme sensitivity to interest rates and compared the model's results to the limited data that is available regarding multifamily ARM performance under economic stress. This analysis confirmed the reasonableness of the ARM model.

These tests of reasonableness employed by OFHEO are discussed below.

(a) Results Provided by the Enterprises

The Enterprises provided, in their comments, computations of cumulative multifamily default rates for two

[113] The Enterprises recently provided data on 40,247 loans. Those loans were combined with pre-1991 Fannie Mae data received in earlier submissions less loans with missing origination dates, leaving 42,334 loans that were used for analysis. Of the 42,334 loans, 58 percent (24,743 loans, primarily seasoned-at-acquisition ARMs) had neither origination nor acquisition DCR data. In NPR2, the missing values were populated by reverse-engineering DCR from the capitalization rate model and origination/acquisition LTV. In the final rule, the cap rate model is not used. Instead, five random samples of the loans with missing origination and acquisition DCR were taken. Each random sample was combined with the 42 percent of loans that were not missing origination/acquisition DCR. All samples produced similar model estimation results; however, the one with the best goodness of fit was selected as the analysis data set. As in NPR2, in creating loan-year records from loan-level data, records prior to the year of Enterprise acquisition were removed to avoid left-censoring bias. Also, prepayments were right-censored in the year of loan termination. *See* C.B. Begg and R. Gray, ''Calculation of Polychotomous Logistic Regression Parameters Using Individualized Regressions,'' *Biometrica* (1984).

[114] The New Book flag is the reciprocal of the program restructuring variable in NPR2, but it has the same affect. The New Book Flag decreases the default rate on New Book loans, while the program restructuring variable increased the default rate on Old Book loans. The larger impact of the New Book Flag coefficient in the final rule reflects four additional years of loan performance that show lower default rates, all else being equal, for New Book loans in general than were indicated previously. Another reason for the larger absolute value of the coefficient on New Book loans is that adjustments to Old Book data were not made in the final rule. In NPR2, origination/acquisition DCR was adjusted downward and origination/acquisition LTV was adjusted upward for Old Book loans. Freddie Mac commented that it was not the case that every Old Book loan had an overstated DCR and an understated LTV. OFHEO concluded that the adjustment proposed in NPR2 was not appropriate for every Old Book loan and that it did not resolve Old Book data integrity issues. Therefore, the final rule does not use the NPR2 adjustments to the Old Book loans.

[115] The ratio update process may have been performed by the Enterprise itself or under delegated authority by a qualified seller/servicer either at loan origination or at Enterprise acquisition.

[116] *See* Table 34 of NPR2, 64 FR 18203, April 13, 1999 (National values for depreciation write-offs, 1983–1995).

specific newly originated fixed-rate products—the 15-year fixed-rate balloon (Fannie Mae) and the ten-year fixed-rate balloon (Freddie Mac)—as examples of rates that they considered to be reasonable for managing multifamily risk. Both Enterprises used the NPR2 rent and vacancy scenario to produce the results and each stated that the default rates assumed zero prepayments and were for 30-year amortization loans with eight percent coupons. The respective default rate tables were divided into cohorts by current DCR immediately prior to the stress test and origination LTV. Fannie Mae's results were generated using the NPR2 cash default model. Freddie Mac's results were generated using a different model that was specified explicitly, including coefficients (some of which Freddie Mac estimated and others of which Freddie Mac assumed).[117]

OFHEO replicated the tables of default rates provided by Fannie Mae and Freddie Mac, using the multifamily default model in the final rule, along with the newly constructed rent and vacancy scenario. Under the same assumptions of zero prepayments, an 8 percent coupon, 30-year amortization, newly originated product immediately preceding the stress test, OFHEO obtained results similar to those provided by Fannie Mae for the 15-year balloon and to those provided by Freddie Mac for the 10-year balloon. For example, for a loan with a 1.20 DCR immediately prior to the stress test and an 80 percent origination LTV, Fannie Mae suggested an 18 percent cumulative conditional default rate for the 15-year balloon and Freddie Mac recommended a 21 percent cumulative default rate for the 10-year balloon. OFHEO's multifamily default model in the final rule produced cumulative conditional default rates for the 15-year balloon and for the 10-year balloon of 26 percent and 30 percent, respectively, for the non-ratio-updated products and of 15 and 18 percent, respectively, for those products that underwent the ratio-update process.

OFHEO believes that the consistency with which its model results tracked those provided by Fannie Mae and Freddie Mac for the products and DCR/LTV combinations they supplied helps confirm the reasonableness of OFHEO's model results. Fannie Mae suggested, however, that their tabular default rates (or ones like them) be used directly for all loans with a balloon year multiple of 3.0 at maturity for balloon loans and that various other indicators of default risk such as product-type, book of business, and loan age be ignored. OFHEO did not accept this suggestion, because evidence from various default studies as well as actual observed default rates of Fannie Mae's own portfolio of multifamily loans show that default rates do vary significantly by product type, age, and factors other than current DCR, origination LTV and balloon maturity risk. OFHEO has captured those other risk factors while ensuring the reasonableness of model results.

(b) Rating Agency and Related Analyses

Rather than targeting stressful economic conditions, most studies of the determinants of multifamily default have estimated models over whatever time period data are available, which may or may not contain a period of economic stress. As a result, OFHEO turned to the rating agencies for industry norms with regard to cumulative default rates of multifamily loans under stress. Each rating agency's methodology for assessing credit risk is similar to the others', although some focus on DCR as the primary determinant of default and others on both DCR and LTV. Though they share their methodologies in print and on the internet, the rating agencies often do not report subordination levels for large groups of loans outside of specific security transactions. Fitch IBCA is the exception.

Fitch IBCA studied 18,839 loans in 33 commercial transactions issued between 1991 and mid-1996.[118] The database was composed of two distinct subgroups, loans from Resolution Trust Corporation (RTC) transactions and conduit loans,[119] and a default was defined as a delinquency of 60 or more days on a mortgage payment or a delinquency of 90 or more days on a balloon payment. Without regard to CMBS property type,[120] Fitch found average annual default rates of 4.37 percent and 1.97 percent, respectively, for RTC and conduit loans. Fitch described the differential (36 percent versus 18 percent over ten years, assuming no prepayments) as possibly attributable to qualitative differences between the pools or the result of other factors such as seasoning (RTC loans are described as highly seasoned; conduit loans are described as typically newly-originated at the time of securitization). The average annual default rate on multifamily properties was 3.9 percent. This finding translates to a 32.8 percent cumulative default rate over 10 years, assuming no prepayments.

In another report, Fitch ICBA posts a table of single-A recession default probabilities by DCR category, adjusted to reflect stressful economic conditions, but not the mix of collateral and structural characteristics in the loans.[121] The default probabilities ranged from a low of 20 percent (>1.75 DCR) to a high of 80 percent (<0.49 DCR), with 40 percent representing the maximum cumulative default probability for positive (>1.00 DCR) cash flow loans.

A study of the commercial mortgage holdings of the life insurance industry finds that book value credit losses averaged 76 basis points per year over the 1972–1996 period, with an annualized volatility of ±31 basis points.[122] Using this study's assumed 30 percent loss severity rate, ten-year default rates are roughly equivalent to a maximum of 34 percent.

The studies cited above represent those that OFHEO believes best represent cumulative multifamily default rates under stressful economic conditions. Nevertheless, the studies are not entirely comparable to the stress test because they may not have analyzed loan performance over a period of time as stressful as the stress test. Additionally, they either did not address the type of multifamily product analyzed or stated specifically that only fixed-rate loans were included. Therefore, the range of cumulative default rates of 30–40 percent would not be applicable to multifamily ARMs. Further, the studies defined default more broadly than does the stress test. The stress test defines default as a foreclosure rather than a 60- or 90-day delinquency. This discrepancy means that, all else equal, the 30-40 percent default rate range found in the studies would be lower if OFHEO's narrower default definition were used. Because

[117] OFHEO tested Freddie Mac's model with the same Enterprise data used to estimate OFHEO's multifamily default model in the final rule. OFHEO found poorer overall goodness of fit results than those achieved with OFHEO's multifamily default model. OFHEO's multifamily default model in the final rule had a Hosmer-Lemeshow (HL) goodness of fit statistic of 32.192; (72.0 percent concordant, 24.2 percent discordant, 3.8 percent tied) compared with an HL statistic of 122.62; (63.3 percent concordant, 28.4 percent discordant, 8.3 percent tied) for Freddie Mac's model. Lower HL statistics indicate better goodness of fit. *See* David W. Hosmer, Jr. and Stanley Limeshon, *Applied Logistic Regression* (John Wiley & Sons 1990).

[118] ''Trends in Commercial Mortgage Default Rates and Loss Severity—1997 Update,'' *Structured Finance* (July 20, 1998).

[119] The term ''conduit loans'' refers to loans, most of which are newly originated, that are securitized by mortgage conduits, which generally are brokers.

[120] The data included loans on commercial property other than multifamily projects, *e.g.,* shopping centers or office buildings.

[121] ''Performing Loan Securitization Update,'' *Structured Finance* (March 16, 2000).

[122] Michael Giliberto, ''A Performance Benchmark for Commercial Mortgages,'' *Real Estate Finance* (Spring, 1997).

the rating agency and related studies, to varying degrees, include products of various levels of seasoning and quality, the range of results may be interpreted as a weighted average of default rates for a diversified portfolio of multifamily loans.

Taking the above factors into consideration, OFHEO found the rating agency findings are consistent with the results of OFHEO's multifamily default model in the final rule. Assuming zero prepayments, OFHEO finds a cumulative conditional default rate of 39 percent for a typical Enterprise fixed-rate loan.[123] Further, OFHEO finds that it is reasonable and appropriate to allow default rates in the stress test to vary with product type, product quality, and loan age. As a result, OFHEO has determined that the default rates derived directly from the application of the multifamily default model in the final rule to Enterprise fixed-rate loans will be used, without further adjustment or calibration.

(c) Multifamily ARM Analysis

The Enterprises did not provide default rates considered reasonable for managing multifamily ARM business, and OFHEO found no comparable rating agency or related analyses specifically addressing ARM default rates in stressful economic environments. However, OFHEO also did not model multifamily default rates separately for fixed-rate and ARM product in the final rule. The default models are identical. In their implementation, ARM loans default at higher rates than fixed-rate loans, all else equal, even if interest rates are held stable.[124] However, when interest rates ramp up (plummet) in the first year of the up-rate (down-rate) stress test, ARM loans experience payment shock (reductions), pushing current DCR lower (higher) at any level of NOI. In sharp contrast, fixed-rate loans, which by definition have constant payments, exhibit changes in current DCR that are driven only by changes in NOI. OFHEO finds that this is perfectly consistent with the stress test interest-rate environment mandated in the 1992 Act.

Assuming no prepayments, OFHEO finds a cumulative conditional default rate for a typical Enterprise ARM loan of 29 percent in the down-rate scenario and 97 percent in the up-rate scenario.[125] OFHEO found that ARM down-rate default rates are consistent with fixed-rate default rates, which are in turn consistent with data provided by the Enterprises and with rating agency analyses.

OFHEO also believes that the range of ARM up-rate default rates is not unreasonable given the experience of certain multifamily loans historically. OFHEO tested for the highest level of defaults observed for Federal Housing Administration (FHA) and Enterprise multifamily loans originated in 1979–1992 in contiguous states comprising five percent or more of the U.S. population for a period of two or more consecutive years. The worst weighted average default experience found in the FHA data was for 12 loans originated in 1987–88 in New England (CT, MA, ME, NH, RI, and VT) at 78 percent. The worst default experience for Enterprise multifamily loans—fixed-rate (289 state-year combinations), ARM (six state-year combinations) and combined (two state-year combinations)—was 100 percent. The third-highest level of Enterprise multifamily default experience was for six loans originated in 1979–80 (AR, CO, LA, MT, OK and WY) at 87 percent while the seventh-highest level of ARM default experience for the Enterprises was for six loans originated in 1984–86 (CT, MA, ME, NH, RI, VT) at 91 percent. OFHEO found these statistics useful in that they substantiate the fact that default rates of the magnitude found in the up-rate scenario for multifamily ARMs have indeed occurred and would be likely to recur in an economic environment such as the stress test. As a result, OFHEO has determined that the default rates derived directly from the application of the multifamily default model in the final rule to Enterprise ARM loans will be used, without further adjustment or calibration.

b. Multifamily Prepayment Model

The proposed rule used the following variables to determine prepayment rates for multifamily loans:

- Mortgage Age Variables—Used to capture change in the risk of prepayment as loans age.
- Relative Spread—Used to reflect the value to the borrower of the option to prepay and refinance.
- Current LTV—Used to capture the incentive for borrowers to refinance in order to withdraw equity from rental property.
- Probability of Qualifying for Refinance—Used to reflect the likelihood that a property financed by a balloon loan would qualify for a new loan, based on minimum requirements of 80 percent LTV or less and 1.20 DCR or more.
- Pre-balloon Refinance Incentive—Used to give extra weight to the relative spread in the two years prior to the balloon maturity to capture additional incentive to prepay balloon loans after the date the yield maintenance period ends, but before the balloon maturity date.
- Conventional Market Rate for Mortgages—Used to reflect the incentives for borrowers with ARMs to refinance into fixed-rate mortgages.
- Years-To-Go in the Yield-Maintenance Period—Used to capture the declining cost of yield maintenance to the borrower in the later years of the yield-maintenance period.

(i) Comments

Many comments addressed the proposed multifamily prepayment models. None were supportive of the proposed approach. Several of these comments suggested that the data are too limited to support the five separate models used in NPR2. The Enterprises and others expressed a view that the proposed rule incorporated incorrect assumptions about the cost to the borrower (and, therefore, about prepayment of loans) throughout the yield-maintenance or prepayment penalty period. Commenters also argued that the prepayment models were overly complex in the number of variables and the treatment of those variables. Most of these commenters contended that only a small percentage of loans prepay during the yield maintenance or prepayment penalty periods and, of those that do, virtually all are required to pay yield maintenance fees or prepayment penalties, which are designed to

[123] Using Enterprise data, OFHEO defined the typical Enterprise multifamily loan as a ten-year fixed-rate balloon loan, with an origination LTV of 80 percent and a current DCR at the start of the stress test of 1.20. Roughly 86 percent of Enterprise fixed-rate loans are from the New Book and 65 percent of fixed-rate loans qualify for the Ratio Update Flag. The mean age of fixed-rate loans at the start of the stress test is 48 months. The current DCR and origination LTV ranges represent the highest frequency distribution category for Enterprise fixed-rate loans. OFHEO produced the default rates using those ranges along with the mean loan age and share of New Book and Ratio Update loans (in lieu of 1 and 0 for those flags). In practice, those flags would either be 1 or 0.

[124] The New ARM Flag retracts much of the reduction in default risk that the New Book Flag conveys.

[125] Using Enterprise data, OFHEO defined the typical Enterprise multifamily ARM loan as one indexed to the 11th District Cost of Funds, with periodic rate caps and floors of two percent, annual payment caps of 7 percent and a 1.25 negative amortization limit, an origination LTV of 80 percent and a current DCR at the start of the stress test of 1.20. Roughly 50 percent of Enterprise ARM loans are from the New Book and 3 percent of ARM loans qualify for the ratio update treatment. The mean age of ARM loans at the start of the stress test is 91 months. The current DCR and origination LTV ranges represent the highest frequency distribution category for Enterprise ARM loans. OFHEO produced the default rates using those ranges along with the mean loan age and share of New Book and Ratio Update loans (in lieu of 1 and 0 for those flags).

compensate an Enterprise for loss of interest income. These comments suggested that, by not taking prepayment provisions properly into account, the stress test overstated prepayments, particularly in the down-rate scenario. The Enterprises both recommended that the final rule eliminate much of the complexity of the proposal in favor of using fixed prepayment percentages per month. Freddie Mac recommended zero percent in the up-rate scenario and, in the down-rate scenario, zero percent within yield maintenance or other prepayment penalty periods and 25 percent per year outside such periods. Fannie Mae recommended a similar approach, suggesting prepayments in the up-rate scenario of 0.02 percent per month and, in the down-rate scenario, 0.2 percent per month within prepayment penalty periods and two percent per month outside those periods.

(ii) OFHEO Response

OFHEO has considered the comments, studied the operation of the yield maintenance provisions in Enterprise multifamily loans agreements and reviewed the literature regarding multifamily prepayments. Given the limitations of Enterprise data, OFHEO has concluded that a prepayment model would not provide greater precision or risk sensitivity than a fixed schedule of prepayments in the two interest rate scenarios. OFHEO has also determined that the yield maintenance and other prepayment penalty provisions in Enterprise multifamily loans are sufficient either to discourage prepayments during prepayment penalty or yield maintenance periods or to ensure that the Enterprises are entitled to the specified compensation. However, modeling these various prepayment provisions would add additional complexity to the model, which OFHEO finds unwarranted given the small number of times yield maintenance or prepayment penalties are required to be paid.

OFHEO agrees with Freddie Mac with regard to the lack of multifamily prepayments in the up-rate scenario. Fannie Mae suggested there should be only negligible prepayments (0.02 percent per month) in the up-rate scenario. OFHEO recognizes that it is not cost effective for multifamily borrowers to prepay their mortgages at positive spreads of the market interest rate from the note rate and, as a result, they are highly unlikely to do so, particularly when yield maintenance or other prepayment penalties are involved. As a result, OFHEO will use zero prepayments in the up-rate scenario for multifamily loans.

OFHEO disagrees with Freddie Mac's recommendation of zero prepayments in the down-rate scenario inside prepayment penalty periods. Freddie Mac's recommendation of zero prepayments in the up-rate scenario (both inside and outside prepayment penalty periods) and in the down-rate scenario inside prepayment penalty periods suggests that Freddie Mac believes that Enterprise loans never prepay within yield maintenance or prepayment penalty periods. OFHEO recognizes that yield maintenance and other types of prepayment penalty provisions are effective deterrents to multifamily prepayments, as they raise (sometimes significantly) transactions costs, thereby requiring a larger drop in interest rates, all else equal, to trigger a prepayment decision. However, one study contends that prepayments do occur during yield maintenance and other prepayment penalty periods and should be priced for.[126] This study examined five different types of prepayment penalty structures finding that yield maintenance is the most effective type of the prepayment penalty structures studied. Also, Enterprise data provided to OFHEO for analysis show that just over seven percent of loans that prepaid had prepaid within their prepayment penalty periods.[127] Since Enterprise data are not sufficiently detailed to delineate different prepayment structures at this time, it is likely that the observed prepayments may be more related to one type of structure than to another or to the length of time remaining before the expiration of the penalty altogether. OFHEO also would expect the number of prepayments to be larger regardless of the prepayment penalty structure if the loan interest rate, taking into account prepayment penalty fees, was strongly in the money, as it would be in the down-rate scenario. As a result, OFHEO has specified 2 percent per year prepayments inside yield maintenance and other prepayment penalty periods during the down-rate scenario. This percentage allows marginally fewer prepayments than recommended by Fannie Mae (0.2 percent per month or 2.37 percent per year) due to the fact that OFHEO is not modeling the fee income generated by the limited number of prepayments inside prepayment penalty periods in the down-rate scenario.

OFHEO generally agrees with Freddie Mac's and Fannie Mae's respective recommendations of 25 percent per year and 2 percent per month (21.5 percent per year) prepayments outside of yield maintenance and prepayment penalty periods in the down-rate scenario. One study found that the most important determinant of multifamily prepayment was the ratio of the mortgage note rate to the current market interest rate.[128] Using coefficients provided in the study and assuming a newly originated loan (because parameter estimates for the age function were not provided), OFHEO found a 29 percent per year prepayment rate for multifamily loans outside of yield maintenance and other prepayment penalty periods, confirming the reasonableness of Fannie Mae's and Freddie Mac's estimates. Additionally, in the Enterprise data, OFHEO found extreme differences in multifamily prepayments during and after prepayment penalty periods. This observation is supported by a study that finds that prepayments are typically close to zero within prepayment penalty periods, then spike up in a ''hockey stick'' fashion as soon as the prepayment penalty period expires.[129] Further, another study found that, in general, multifamily and other commercial borrowers are more ''ruthless'' or have greater interest rate sensitivity than, for example, single family borrowers, making them more likely to prepay at any given level of negative spread between market rates and note rates, particularly when transactions costs such as prepayment penalties are not at issue.[130] For these reasons, OFHEO has decided to specify 25 percent prepayments per year outside yield maintenance and other prepayment penalty periods in the down-rate scenario. This specification is consistent with the mid-point of the 21 percent to 29 percent range provided by

[126] Qiang Fu, Michael LaCour-Little and Kerry Vandell, ''Multifamily Prepayment Behavior and Prepayment Penalty Structure'' (Working Paper, December 21, 1999).

[127] According to Enterprise data through 1999 submitted to OFHEO for analysis, 15 percent of Enterprise multifamily loans have yield maintenance or other prepayment penalty provisions. Of those, 9 percent (660 loans) terminated in or before 1999—the last recorded year of data. Of those that terminated, 113 loans had prepaid through 1999. Of those, 8 loans (7.1 percent) prepaid within their prepayment penalty periods and 105 loans (93 percent) prepaid outside their prepayment penalty periods. The remaining 547 were loans that had not prepaid as of the end of 1999.

[128] Qiang Fu, et al., *supra* n. 126.

[129] Jesse M. Abraham and Scott Theobald, ''A Simple Prepayment Model of Commercial Mortgages,'' *Journal of Housing Economics* (1995).

[130] James R. Follain, Jan Ondrich, and Gyan Sinha, ''Ruthless Prepayment: Evidence from Multifamily Mortgages,'' 41 *Journal of Urban Economics* (1997).

Freddie Mac, Fannie Mae and in the literature.

c. Multifamily Loss Severity Calculation

To determine loss severity rates on all conventional multifamily loans, other than NT loans covered by repurchase agreements, NPR2 used the same cost and revenue elements and discounting procedures used for conventional single family loans, except that property values were not updated to determine the loss of loan principal balance. The cost and revenue components were averages from Freddie Mac real estate owned (REO) originated in the 1980s. Loss severity rates on NT loans subject to repurchase agreements were set at a fixed rate based upon Enterprise historical experience and seller/servicer claim rates for 90-day delinquent multifamily loans. For FHA loans, the severity rate was set at three percent of UPB to reflect the cost of assigning defaulted loans to the Department of Housing and Urban Development.

Several comments addressed the loss severity calculations proposed in NPR2.[131] In general, commenters did not object to the methodology employed by OFHEO. They did, however, suggest that the loss severity rates arrived at with this approach were higher than industry averages and recommended that OFHEO simply apply a uniform severity rate to all multifamily loans. At a minimum, commenters recommended that OFHEO assess loss severity rates against industry standards as guidelines for reasonableness, as they had similarly suggested for multifamily default rates. Specifically, Fannie Mae and Freddie Mac commented that the data available to OFHEO, primarily Freddie Mac Old Book loans, were an inappropriate sample to estimate multifamily loss severity. Because of changes in the Enterprises' current loan programs, they contended, the severity rates to be expected on newer loans would be significantly lower than reflected in the data.

OFHEO rejected the suggestion that a uniform severity rate be applied to each multifamily loan in each period of both the up- and down-rate scenarios. Throughout the stress test, rental vacancy rates increase to a peak of 17.5 percent and rent growth is negative for over twenty consecutive months. In an economic situation replicating the ALMO benchmark region and time period, the revenue and cost components of multifamily REO while in inventory, as well as recovery rates on REO sales, would not remain fixed. Studies have shown that multifamily property values fall significantly during regional economic recessions, leading to lower recovery rates on REO.[132] Likewise, rental income would decline as vacancy rates rise. Further, some costs incurred during the REO holding period, such as attorney's fees, would likely remain fixed while others, such as property operating expenses, may shrink as tenants vacate; they may also remain the same or increase as landlords attempt to attract new tenants to replace those that have vacated. OFHEO concluded that fixed loss severity rates for Enterprise multifamily REO would not reflect the requirement that severity rates in the stress test be reasonably related to the conditions of the benchmark loss experience.

OFHEO also concluded that updating the NPR2 methodology with additional data from the Enterprises would not be consistent with the 1992 Act. Given the requirements of the 1992 Act that the stress test must reflect a worst-case loss experience, single family loss severity rates are calculated using cost components, where available, for the ALMO benchmark loans. It would, therefore, be inappropriate to update the multifamily loss severity components simply because newer data from better economic scenarios reflect lower losses. In contrast, OFHEO found it appropriate to update the data used to estimate the multifamily default model, because the model imposes benchmark conditions through the use of ALMO benchmark rent growth and vacancy rates.

OFHEO has determined to use the revenue and cost components of multifamily loss severity as well as the REO recovery rates as published in NPR2, as they represent worst-case Enterprise losses.[133] A simple adding up of the costs components of those figures (without considering discounting, credit enhancements or passthrough interest on sold loans), yields a loss severity rate of 54 percent. OFHEO did, in fact, find higher loss severity rates. Fitch IBCA found loss severity rates ranging from 32 percent to 58 percent on bulk sales of RTC assets. Additionally, and in that same report, Fitch explains that Freddie Mac reports that, if a default occurs, on average 45 percent of the loan balance is lost. Actual Freddie Mac loss severities, however, ranged from 8 percent in the Northeast to 52 percent in Alaska. Finally, in describing Fannie Mae's 70–75 percent recovery rates on multifamily REO, Fitch concludes that their historical loss information did not include recoveries during adverse market conditions.[134]

OFHEO has simplified the loss severity calculation in the final rule. The six separate loss severity calculations proposed in NPR2 are replaced by one loss severity equation, which eliminates the redundancy in the first four equations. Those equations differed only in that one of them accounted for passthrough interest on sold loans and one did not. Similarly, one of them accounted for loss-sharing receipts on loans covered by loss-sharing agreements and one did not. Passthrough interest on sold loans and loss-sharing receipts remains part of the loss severity calculation. However, the final rule simply calculates four months of passthrough interest on sold, but not on retained loans, and loss-sharing receipts, if applicable, are included with other forms of credit enhancements.

In addition, the separate methodology used in NPR2 for arriving at loss severity for NT loans with repurchase agreements has been eliminated in the final rule. OFHEO determined that the NPR2 loss severity of 39 percent for these loans, arrived at by multiplying a 70 percent historical foreclosure rate by 56 percent (the share of Freddie Mac's 90-day delinquencies that end in foreclosure or other costly loan resolutions), is no longer applicable. OFHEO determined that the correct place to account for the potential cure rate of 90-day delinquent loans (as opposed to those that ultimately would end in foreclosure), is in the multifamily default model, rather than in the loss severity calculation. Appropriately, OFHEO included a correction there.[135]

[131] NPR2 actually proposed six severity treatments: (1) retained cash loans without recourse, (2) sold cash loans without recourse and NT loans without repurchase, (3) retained cash loans with recourse, (4) sold cash loans with recourse, (5) NT loans with repurchase, and (6) FHA loans. The NT distinction has been eliminated in the final rule, as discussed above at III.I.3.a.i., Negative Equity and Current LTV Variables and no comments were received about the three percent severity rate imposed upon FHA loans. For these reasons, references to the NPR2 approach are to the first four treatments, unless otherwise indicated.

[132] ''Commercial Mortgage Stress Test Research,'' *Structured Finance* (October 23, 1998); ''Trends in Commercial Mortgage Default Rates and Loss Severity—1997 Update,'' *Structured Finance* (July 20, 1998).

[133] For simplicity, foreclosure costs and operating losses are added together as net REO holdings costs.

[134] ''Commercial Mortgage Stress Test Research,'' *supra,* note 132.

[135] In multifamily default modeling, the default event for NT loans repurchased by seller/servicers must be a 90-day delinquency, as OFHEO was not supplied with information regarding the final resolution of these loans. OFHEO adjusted for the broader definition of defult for NT loans (90-day delinquency) relative to the one used for all other multifamily loans (foreclosure) by undersampling NT defaults for inclusion in the historical estimation data set prior to model estimation. A stratified random sample of loans missing both origination and acquisition DCR was taken for

Continued

For FHA loans, the final rule retains the severity rate of three percent of UPB that was proposed in NPR2 to reflect the cost of assigning defaulted loans to the Department of Housing and Urban Development.

J. Other Credit Factors

To reflect counterparty or security defaults during the stress period, NPR2 proposed to reduce the payments from each counterparty or security to the Enterprises by an amount, or ''haircut,'' determined by the public credit rating of the counterparty or security. These haircuts were phased in linearly over the 120-month stress period beginning in the first month. OFHEO received a considerable number of comments on the level, timing, and calculation of the haircuts, which are discussed below by topic.

1. Haircut Levels for NonDerivative Counterparties and Securities

For all securities and counterparties except derivative contract counterparties, NPR2 proposed ten-year cumulative haircuts of ten percent for counterparties and securities rated triple-A, 20 percent for double-A, 40 percent for single-A, and 80 percent for triple-B and below and for unrated counterparties or securities. These haircuts were based on a consideration of Moody's 1998 study of corporate bond defaults, Standard and Poor's (S&P) approach to rating structured mortgage securities, and Duff & Phelps' (D&P) approach to evaluating credit supports provided by mortgage insurance companies. [136]

a. Comments

A number of commenters, including the Enterprises and several Wall Street firms, disagreed with OFHEO's methodology, asserting that the resulting haircuts were too severe and not representative of historical experience. In particular, they suggested that OFHEO's proposed haircuts were greater than those that would be implied by the Great Depression, citing the 1958 study of corporate bonds by W. Braddock Hickman.[137] These commenters concluded that the default rates implied by OFHEO's haircuts were too high.

Freddie Mac questioned the appropriateness of basing stress test haircuts on S&P's approach, because S&P uses it to evaluate structured finance securities. Structured finance transactions, Freddie Mac asserted, require credit support levels to cover risks not faced by the Enterprises because in such transactions there is little ongoing risk management capability, no diversification across pools, and no ability to retain earnings. Instead, Freddie Mac recommended basing the haircuts on both default and recovery rates. It suggested developing default rates by 1) comparing mortgage default rates associated with the benchmark loss experience to average mortgage default rates, stating that the former are roughly three times higher than the latter, and 2) applying this multiple to Moody's average ten-year cumulative corporate bond default rates since 1970. Freddie Mac provided an analysis supporting cumulative haircuts of 1.2 percent for triple-A, 1.5 percent for double-A, 2.3 percent for single-A, and 6.6 percent for triple-B and below and unrated, and recommended that these haircuts be adjusted downward by at least 30 percent in the up-rate scenario, to reflect general price inflation. Freddie Mac suggested that OFHEO assume a 50 percent recovery rate for defaulting mortgage insurers, citing the liquidation of a mortgage insurance company in the 1980's, and a 50 percent liquidation value for defaulting securities, citing Hickman and Moody's. The Moody's study used defaulting bond prices as the basis for evaluating recoveries; the Hickman study evaluated actual recoveries for bond defaults resolved before 1944, and January 1, 1944, prices for bonds trading below their amortized book value at that time.

Fannie Mae objected to OFHEO's reliance on rating agency approaches because it believes they are inconsistent with the data in the post-1970 period and not reasonably related to the benchmark loss experience. Based on its own analysis, Fannie Mae recommended default-based haircuts of three percent for triple-A, four percent for double-A, eight percent for single-A, and twelve percent for triple-B and below and unrated, and suggested that first-year defaults should not exceed 0.50 percent for triple-A-rated and 1.0 percent for double-A and single-A rated credits. Citing Hickman and Moody's, Fannie Mae described its suggested default rates as ''very conservative and substantially in excess of bond default performance over the benchmark time period'' Fannie Mae further suggested that these haircuts be reduced by an assumed liquidation value of 50 percent for securities, to account for recoveries, and by insurance premiums and servicing fees, to offset losses on insurer and recourse counterparty defaults. Another commenter pointed out that servicing fees under Fannie Mae's multifamily DUS program include a substantial risk premium.

In general, GE Capital supported OFHEO's haircut proposal except for the treatment of interest rate and currency derivative contract counterparties, which is discussed below under III.J.2., Derivative Contract Counterparties. In its reply comments, GE Capital pointed out that OFHEO's haircuts are consistent with rating agency discounts of reinsurance benefits, but noted that by imposing them over time, OFHEO's haircuts are far less than those discounts. MICA also supported OFHEO's haircuts but argued that triple-A and double-A mortgage insurers should be treated more favorably than other counterparties, with no distinctions between triple-A and double-A rated mortgage insurers. (*See* section III.J.5., Mortgage Insurer Distinctions below.)

In their reply comments, GE Capital and MICA criticized the way the Enterprises used the Hickman and Moody's studies to suggest lower haircut levels. They noted that the Enterprises included data from the Hickman study on defaults only for large issues, which are generally substantially lower than for smaller issues of the same rating, and that the Enterprises had insufficient basis for their extrapolation of ten-year default rates from quadrennial data. They also questioned the Enterprises' exclusion of earlier corporate default experience in their reliance on Moody's average default rates since 1970. GE Capital

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inclusion in the estimation data set. Those loans sampled were overwhelmingly NT (68 percent), seasoned-at-acquisition (64 percent), and ARMs (63 percent). By contrast, loans with either origination or acquisition DCR were overwhelmingly non-NT (90 percent), newly-originated at Enterprise acquisition (80 percent), and fixed-rate mortgages (95 percent). A 10 percent stratified random sample of loans missing both origination/acquisition DCR yielded 2,498 loans (157 defaults and 2,303 non-defaults). The default sample wsa reduced to 126 loans based upon an estimated cure rate of 30 percent for the portion of the loans missing both origination and acquisition DCR that were NT.

[136] ''Historical Default Rates of Corporate Bond Issuers, 1920–1997,'' Moody's Investors Service, February 1998; S&P's Structured Finance Criteria,'' Standard & Poor's Corporation, 1988; and ''Evaluation of Mortgage Insurance Companies,'' Duff & Phelps, November, 1994. The Moody's study, which showed cumulative default rates over various time horizons for each rating category, suggests that the ten-year cumulative default rate roughly doubles for each one-level drop in rating category. In rating structured mortgage securities, S&P discounts the claims-paying ability of mortgage insurers in a double-A stress environment by 20 percent for double-A-minus-rated mortgage insurers, and 60 percent for single-A-rated insurers. In rating mortgage insurers in a triple-A stress environment, D&P discounts double-A rated reinsurers by 35 percent, single-A-rated reinsurers by 70 percent, and triple-B-rated reinsurers by 100 percent.

[137] W. Braddock Hickman, *Corporate Bond Quality and Investor Experience*, National Bureau of Economic Research (1958).

pointed out that using an average observation plus three standard deviations would be a more statistically valid method of establishing stress test default rates than using a multiple of three, and would result in default levels significantly higher than those suggested by the Enterprises but lower than those reflected in the haircuts proposed by NPR2.

Neither GE Capital or MICA favored reflecting recoveries, primarily because they regard the Enterprises' assumptions as questionable and unsupported by authoritative data.[138] Both disagreed that defaulted bond prices serve as a proxy for recovery rates on mortgage credit enhancements and questioned whether mortgage insurance premiums (especially if paid up front) or servicing rights would offset losses on mortgage credit enhancements to any significant extent.

World Savings asserted that the haircut differentials between triple-A, double-A and single-A ratings in NPR2 were too great, citing Moody's and S&P's rating definitions. It proposed haircuts for these ratings of five percent, ten percent, and fifteen percent, respectively, with significantly larger haircuts applied to lower-rated institutions, particularly those with non-investment grade ratings.

b. OFHEO's Response

In NPR2, OFHEO pointed out certain conceptual similarities between its approach to discounting for counterparty risk and those of the rating agencies, but did not rely on rating agency methodologies for default levels. For example, OFHEO's use of haircuts to reflect losses due to counterparty failure is similar to the methodology of Moody's, S&P and D&P.[139] OFHEO's approach is also similar to that of S&P and D&P in that in the proposed stress test, failing counterparties meet some but not all of their obligations (i.e., over time, haircuts increase to a maximum level), rather than meeting all of their obligations until the counterparty fails (i.e., haircuts are constant over time). OFHEO also observed that Moody's 1998 bond study revealed that default rates roughly double for each drop in ratings and employed a similar relationship in defining haircuts for the various rating categories. OFHEO does not believe that consideration of these concepts is inappropriate for the purposes of the stress test, regardless of the purpose for which the rating agency methodologies were developed. With respect to default levels, OFHEO noted in NPR2 that the default levels reflected in maximum haircuts included in NPR2 are higher than recent experience and, according to Moody's 1998 study, six to ten times the average ten-year cumulative default levels from 1920 through 1997.

In the course of evaluating the recommendations for lower haircuts, OFHEO reviewed Moody's 2000 bond study,[140] as well as the Hickman study. According to Hickman, the worst four-year cumulative default rates for investment grade corporate securities were 6.2 percent (1932–35) and 7.0 percent (1912–15).[141] In order to compare these rates with the historical average, OFHEO extrapolated ten-year rates consistent with these four-year rates, which were 21.0 and 23.7 percent, respectively.[142] These rates are 4.3 and 4.9 times greater than the historical average ten-year rate for the period from 1920–1999 of 4.85 percent from the Moody's study. As shown in Table 5 below, the default levels the Enterprises proposed as a basis for stress test haircuts (which they recommended be reduced by 50% to account for recoveries) reflect significantly lower multiples of Moody's average historical 10-year cumulative default rates than the extrapolated ten-year default rates that occurred during the most stressful periods identified by Hickman. Based on this analysis, OFHEO concluded that while the default rates reflected in the haircuts included in NPR2 were high, the default rates proposed by the Enterprises are too low.

TABLE 5.—COMPARISON OF HISTORICAL 10-YEAR CUMULATIVE DEFAULT RATES WITH THOSE RECOMMENDED BY THE ENTERPRISES AS A BASIS FOR STRESS TEST HAIRCUTS

Rating	(A) Moody's Average Rates 1920–1999 [1]	(B) Freddie Mac's Recommended Haircuts	(B)/(A)	(C) Fannie Mae's Recommended Haircuts	(C)/(A)
AAA	1.09%	2.3%	2.1×	3.0%	2.8×
AA	3.10%	2.9%	1.1×	4.0%	1.3×
A	3.61%	4.7%	1.3×	8.0%	2.2×
BBB	7.92%	13.2%	1.7×	12.0%	1.5×

[1] ''Historical Default Rates of Corporate Bond Issuers, 1920–1999,'' Moody's Investors Service, January 2000, at 27.

With respect to the relationships among cumulative default rates for credits in different rating categories, the Moody's data for 1920–1999, as reflected in the table, show cumulative defaults roughly tripling between the triple-A and double-A categories, increasing by 15% from double-A to single-A, and then doubling from single-A to triple-B, rather than doubling in every case.

Haircuts included in the final rule reflect consideration of the relationship between cumulative default rates in normal and stressful times, the ameliorating effect of phasing in haircuts over time, mixed commenter opinion with respect to recoveries, the potential for insurance premiums or servicing fees to partially offset losses on mortgage credit enhancements, as well as the relationships among cumulative default rates for credits in different rating categories. OFHEO

[138] However, MICA supported lower haircuts for triple-A- and double-A-rated mortgage insurance companies relative to any other counterparties, regardless of rating, as discussed below under ''Rating Categories.''

[139] On June 1, 2000, D&P merged with Fitch ICBA. The merged company is called ''Fitch.''

[140] ''Historical Default Rates of Corporate Bond Issuers, 1920–1999,'' Moody's Investors Service, January 2000.

[141] Hickman, at 189.

[142] These rates were extrapolated by multiplying Hickman's 4-year cumulative default rates from 1932–1935 and 1912–1915 by the ratio of Moody's historical average 10-year rate from 1920–1999 of 4.85 percent to Moody's historical average 4-year rate of 1.43 percent. (Moody's, at 27.)

determined that the haircuts proposed in NPR2 should be reduced and phased in more quickly. In the final rule, maximum haircuts for securities and counterparties other than derivative contract counterparties are lowered from 10 to 5 percent for those rated triple-A, from 20 to 15% for double-A, from 40 to 20 percent for single-A, and from 80 to 40 percent for triple-B. They are phased in linearly over the first five years of the stress period and remain constant thereafter.

2. Derivative Contract Counterparties

In recognition of the routine use of collateral pledge agreements with interest rate and foreign-currency derivative contracts, NPR2 proposed haircuts for derivative contract counterparties[143] that are lower than haircuts for other counterparties. Collateral posted under these agreements is continuously re-evaluated, which limits an Enterprise's risk exposure. For counterparties to interest rate contracts and foreign currency derivative contracts that fully hedge their corresponding exchange rate exposure, NPR2 proposed ten-year cumulative haircuts of two percent for triple-A-rated counterparties, four percent for double-A-rated counterparties, eight percent for single-A-rated counterparties, and 16 percent for counterparties rated triple-B and below and unrated counterparties. In the case of derivative contracts that fully hedge the foreign exchange risk of foreign-currency-denominated debt, NPR2 proposed that the stress test increase the amount in dollars owed by an Enterprise by the derivative haircut percentage. (*See* section III.J.4., Foreign Exchange Risk) below for a discussion of the treatment of any unhedged foreign exchange risk.)

a. Comments

Freddie Mac and Morgan Stanley suggested eliminating the haircuts for derivative contracts entirely, stating that counterparty risk for derivative contracts would more properly be characterized as management and operations risk, and should therefore be subsumed in the 30 percent management and operations risk add-on. Fannie Mae and Freddie Mac proposed, alternatively, that OFHEO apply minimum capital treatment to derivative contract exposure rather than attempting to model cash flows. On the other hand, a number of commenters supported applying the proposed haircuts for mortgage credit enhancement counterparties to interest rate and foreign currency derivative contract counterparties. GE Capital was among these commenters, but favored applying NPR2's haircut for triple-A derivative contract counterparties to contracts collateralized by cash or Treasury securities as of the start of the stress test, to the extent of such collateral coverage.

b. OFHEO's Response

OFHEO rejects the idea that derivative contract counterparty exposure constitutes a management or operations risk, since the magnitude of these exposures, even as mitigated by collateral pledge agreements, is driven by interest rate, credit, and foreign currency risk factors. OFHEO disagrees that minimum capital treatment is appropriate for derivative contract counterparty exposure for two reasons. First, for interest rate derivative contracts, exposure and related collateral requirements likely will vary dramatically between the up- and down-rate scenarios. A simple leverage ratio would not capture such fluctuations. Second, the amount of collateral pledged at the start of the stress test, an important determinant of the minimum capital requirement, will have little relationship to future exposures or the related collateral requirements of derivatives contracts throughout the stress test. For this second reason, OFHEO also disagrees with GE Capital's suggestion that the stress test apply lower haircuts to collateralized exposure on interest rate derivative contracts as of the start of the stress test.

The final rule retains the haircuts for derivative contract counterparties proposed in NPR2 for securities rated triple-A, double-A, single-A and triple-B. Like other haircuts, they are phased in linearly in the first five years of the stress period. Haircuts for derivative contract counterparties are now higher relative to the haircuts applied to other counterparties as a result of the reduction in haircuts for those other counterparties in the final rule, but they remain substantially less than haircuts for nonderivative counterparties.

For certain derivative contract counterparties, the practical difficulties of modeling the instruments according to their terms require the use of simplifying assumptions. (*See,* e.g. discussion under section III.J.4., Foreign Exchange Risk.) For these few instruments, no haircut is applied. When the simplifying assumptions are no longer needed, these counterparties will be subject to haircuts comparable to those for other derivative counterparties.

3. Rating Categories

NPR2 proposed applying haircuts based on public ratings and treating unrated counterparties and investments as if they were rated triple-B and below, the lowest haircut category. In the case of different ratings from different rating agencies, the lowest rating would be used.

a. Comments

Most commenters who addressed the issue supported the use of public ratings, but there was disagreement about OFHEO's treatment of below-investment-grade and unrated counterparties and securities. Some commenters suggested that no credit should be given in the stress test for enhancements provided by unrated or below-investment-grade counterparties. Although the Enterprises supported the rating categories OFHEO proposed, Fannie Mae, along with other commenters, asserted that the assignment of unrated seller/servicers to the triple-B category overstated counterparty risk, especially with respect to Delegated Underwriting and Servicing (DUS) lenders, whose agreements are typically supported by other credit enhancements, such as letters of credit. For these lenders, Fannie Mae suggested reliance on an Enterprise's internal rating classifications. Fannie Mae also suggested reliance on internal ratings when fewer than two ratings are available, or when additional contractual agreements supporting the counterparty obligation exist. In addition, Fannie Mae suggested that relationships with corporate parents might justify an assignment of a parent company's rating to its unrated seller/servicer subsidiaries (rather than the triple-B rating proposed for unrated seller/servicers) for purposes of the stress test. Both Fannie Mae and Freddie Mac recommended that, in the case of split ratings, the stress test apply the median.

b. OFHEO's Response

The final rule makes no change to the proposed treatment of split ratings because OFHEO believes that a conservative evaluation of risk is appropriate for regulatory purposes. Consistent with that belief, and in response to comments, the final rule

[143] For the purposes of the risk-based capital regulation, the term ''derivative contract'' refers only to interest rate, foreign currency, and similar derivative contracts for which values are easily determined; i.e., which can easily be marked to market. It does not include derivative securities or credit derivative contracts, for which markets are not sufficiently developed to facilitate accurate market valuations. (*See* III.K., Mortgage Credit Enhancements, for a fuller discussion of credit derivatives.)

introduces a new haircut category for nonderivative securities and counterparties (except seller/servicers and GSEs) that are rated below investment grade or unrated. The new haircut category recognizes the significant distinctions between the default experience of triple-B- and double-B-rated corporate bond issuers, as reflected in the Moody's data, and the fact that the lack of a public rating often reflects the speculative nature of the credit. The new haircut category is assigned a haircut of 100 percent and is applied in the first month of the stress period. The effect of applying a 100 percent haircut in the first month of the stress period is to write off as a loss below-investment-grade or unrated securities (except securities issued by GSEs), and to give no credit for credit enhancements or derivatives provided by below-investment-grade or unrated counterparties (except seller/servicers). However, to provide for investments that are unrated for reasons other than an inability to obtain a public rating, OFHEO reserves the right to make a different determination on an unrated counterparty or security that would otherwise be subject to the 100 percent haircut, on a case-by-case basis, if an Enterprise presents information about the investment that persuades OFHEO that a different rating is warranted.

The Enterprises do not currently contract with mortgage insurers or derivative contract counterparties that are below investment grade or unrated, and OFHEO has issued policy guidance [144] to the Enterprises emphasizing the importance of high-quality investments for their liquidity portfolios. OFHEO would view the practice of investing in below-investment-grade securities or contracting with below-investment-grade counterparties unfavorably. The introduction of the new haircut category should have little impact on the Enterprises' capital requirements as they currently conduct their businesses, but it will make the risk-based capital regulation consistent with OFHEO's regulatory policy on below-investment-grade investments.

Under the final rule, unrated seller/servicers continue to be treated as if they were rated triple-B, in recognition of the ongoing nature of the Enterprises' relationship with seller/servicers and the contractual leverage available to the Enterprises to manage their exposure to counterparty risk, as well as the credit protection afforded by servicing income and mortgage insurance premiums.

[144] OFHEO Director's Advisory, *Non-mortgage Liquidity Investments,* PG–00–002 (Dec. 19, 2000).

OFHEO rejected the recommendation to use internal Enterprise ratings for unrated seller/servicers, for reasons articulated in NPR2.[145] Neither the Enterprises' internal ratings methodologies nor the ratings themselves are publicly available, and they may not be consistent with each other. OFHEO also declines to assign the rating of a parent company to its unrated seller/servicers subsidiary, just as the NRSROs will not impute a corporate parent's rating to a derivative dealer or credit enhancement counterparty in the context of rating a securities transaction. To do so would require OFHEO itself to ''rate'' the entity, considering the nature and extent of a parent's liability for an entity's obligations.

OFHEO recognizes the desirability of making finer risk distinctions between unrated seller/servicers in a risk-based capital regulation. Therefore, following adoption of this regulation OFHEO will evaluate alternative approaches for assessing the risk of unrated seller/servicers, including establishing criteria under which Enterprise internal ratings could be used, and encouraging the attainment of a NRSRO rating by seller/servicers.

In response to comments that NPR2 did not reflect adequately the risk-mitigating requirements of the DUS program, OFHEO notes the following. DUS lenders, like all seller/servicers, benefit from this favored treatment in addition to the general reduction in haircut levels. Further, the letters of credit that DUS lenders typically post to back up their loss sharing agreements will be modeled, providing a significant offset to the haircut. In addition, DUS lenders are among those who benefit from the inclusion of two variables in the multifamily default model, the New Book indicator and the Ratio Update Flag. The New Book indicator captures the lower default probability for loans acquired under the Enterprises' current multifamily lending programs compared to loans acquired under early loan programs. The Ratio Update Flag reflects the lower default probability for loans on which the underwriting ratios have been reviewed and adjusted at acquisition to Enterprise standards. The effect of these various elements of the stress test is to create substantially lower losses on loans from the DUS or similar programs than on loans that share none of the risk mitigating factors of DUS loans.

An exception to the new haircut category is also made for unrated securities issued by other GSEs. NPR2

[145] 64 FR 18155, April 13, 1999.

stated that the stress test reflects no credit losses on securities issued by Ginnie Mae or the Enterprises,[146] but did not address whether a haircut should be applied to payment due to an Enterprise from securities issued by another GSE. The final rule clarifies that this statement was not intended to apply to securities issued by another GSE held by an Enterprise as an investment (including a Fannie Mae security held by Freddie Mac or a Freddie Mac security held by Fannie Mae). Such unrated securities are treated as AAA-rated securities and haircut accordingly.

To summarize, the haircuts used in the final regulation to discount for all counterparty risk are set forth by rating category and counterparty type in Table 6.

TABLE 6.—HAIRCUTS BY RATING CATEGORY IN FINAL RULE

Ratings Classification	Derivatives	Non-derivatives
AAA	2%	5%
AA	4%	15%
A	8%	20%
BBB	16%	40%
Below BBB & Unrated [1]	100%	100%

[1] Unrated, unsubordinated obligations issued by other GSEs are treated as AAA. Unrated seller/servicers are treated as BBB. Other unrated counterparties and securities are subject to a 100% haircut applied in the first month of the stress test, unless OFHEO specifies another treatment, on a showing by an Enterprise that a different treatment is warranted.

4. Foreign Exchange Risk

In NPR2, OFHEO proposed to model foreign currency derivative contracts that fully hedge the foreign exchange risk of liabilities issued in foreign currencies as synthetic dollar-denominated liabilities. Under the proposal, appropriate haircuts would be determined by increasing amounts of principal and interest due on the synthetic liabilities by the amount of the derivative contract haircut appropriate to the counterparty.[147] (Applying the same approach to contracts hedging

[146] *See id.*

[147] Theoretically, the haircut should be applied based on the amount of foreign currency to be paid to the Enterprise in the transaction. However, these amounts cannot be calculated, because foreign currency values are not projected in the stress test. Therefore, for purposes of computing a capital number for a currency swap, using the dollar side of the transaction is used as the basis to determine total cash flow haircuts.

foreign-currency-denominated assets, amounts received from a synthetic asset would be reduced by the same percentage.) To the extent foreign exchange risk exposure is not fully hedged, NPR2 proposed to assume an adverse percentage change in the value of the foreign currency versus the United States dollar equal to the amount of the percentage change in the ten-year CMT, which resulted in a significantly larger haircut.[148] OFHEO did not propose to apply netting provisions to foreign currency derivatives, because netting of all of a counterparty's derivative contracts would require the modeling of all of their cash flows. Accordingly, instead of modeling all cash flows for foreign-currency-denominated contracts, NPR2 simply adjusted the debt payment amounts.

a. Comments

Fannie Mae supported the modeling of foreign-currency-denominated debt and associated foreign currency swaps as synthetic dollar-denominated instruments, but commented that the resulting haircuts were excessive. It pointed to the lack of netting of payments within an individual swap and among payments across all swaps with a single counterparty, and the fact that the haircuts would be consistently applied, whether a derivative was ''in the money'' or out ''of the money.'' [149] The Enterprise suggested that for foreign exchange contracts, the minimum capital standard, which ''provides for generally higher capital charges for foreign exchange contracts than other types of derivative contracts,'' should apply. Fannie Mae also commented that OFHEO should delete from the final regulation the NPR2 treatment for unhedged foreign currency transactions, because none currently exist in Fannie Mae's book of business. Finally, Fannie Mae objected to a footnote in the preamble to NPR2 that indicated that the same type of treatment used for foreign currency derivatives would be applied to any instrument that was denominated in or linked to units or values that are not included in the stress test.[150] Fannie Mae stated that this footnote would create a bad precedent and that any such instrument should be dealt with on a case-by-case basis.

b. OFHEO's Response

The final rule does not adopt Fannie Mae's recommendation to employ netting within a swap or among all swap payments with a single foreign currency swap counterparty. The synthetic debt approach is inconsistent with netting because it effectively models only the dollar-denominated pay side of a swap, not the foreign-currency-denominated receive side. Without modeling both sides of a swap, netting of the payments associated with such derivatives is not feasible. OFHEO takes an appropriately conservative approach by treating foreign currency derivatives as always being ''in the money'' because, without explicitly modeling foreign currencies, there is no basis for determining whether a contract is ''in'' or ''out of the money.'' OFHEO also rejects the application of minimum capital treatment for derivatives for reasons discussed above at section III.J.2.b., OFHEO's Response. However, because foreign currency values are not projected in the stress test, OFHEO has decided not to apply haircuts to foreign currency swap counterparties by adding the haircut percentage to the pay side of the swap. As a simplifying assumption, no haircut is applied in the final rule. However, OFHEO continues to believe that some haircut is appropriate and will continue to explore whether some other methodology is more appropriate.

Notwithstanding Fannie Mae's comment that it currently has no unhedged foreign currency exposure, it is conceivable that unhedged positions could arise, because the Enterprises issue securities denominated in foreign currencies and use foreign currency derivatives to hedge the exchange risks associated with these securities. For this reason, the final rule retains a treatment for them. If the Enterprises follow their current policies and continue to use swaps to fully hedge all foreign currency risk, the treatment of unhedged positions in the regulation will be a moot issue. If these policies change, or through error or inadvertence are adhered to imperfectly, the regulation includes an appropriately conservative treatment to deal with any instruments that are left unhedged.

In regard to the footnote related to instruments that are denominated in, or linked to, units or values that are not included in the stress test, OFHEO will consider such instruments, including unhedged derivatives (other than standard interest rate or foreign currency derivatives) or other unusual instruments that appear at the Enterprises, on a case-by-case basis. Where the stress test includes a specific treatment or the capability to model the instrument according to its terms, OFHEO will do so. Other instruments may be accorded alternative modeling treatments in accordance with section 3.9, Alternative Modeling Treatments, of the Regulation Appendix. The footnote was intended to indicate that a treatment similar to that for unhedged foreign currency exposures would likely be appropriate for such instruments. If the instruments involve a new activity for an Enterprise, it should notify OFHEO as soon as possible of the existence of the transaction and request an estimated treatment in the stress test in accordance with section 3.11, Treatment of New Enterprise Activities, of the Regulation Appendix.

5. Mortgage Insurer Distinctions

NPR2 proposed haircuts that double for every decrease in rating category for all securities and counterparties, other than unhedged foreign currency derivative contract counterparties, without distinguishing between types of counterparties.

a. Comments

MICA and Triad GIC argued for preferred treatment for mortgage insurers rated triple-A and double-A over securities and other types of counterparties, and, along with Neighborhood Housing, opposed differentiating between mortgage insurers rated triple-A and double-A. MICA emphasized that mortgage insurance companies' ratings are based solely on their ability to manage and absorb mortgage credit risk losses in a stress scenario and cited the effectiveness of state insurance regulation. Several other commenters, including another mortgage insurer, urged OFHEO to maintain the distinction.

b. OFHEO's Response

OFHEO believes that NRSROs take into account all of the relevant risk characteristics when assigning ratings, including those cited by the commenters, and seek to maintain comparability of the ratings as risk indicators across industries. Therefore, in the absence of quantitative data demonstrating a better credit performance of mortgage insurance companies versus similarly rated

[148] NRP2 provided that in the event OFHEO finds that the foreign currency risk on any liability or derivative instrument has not been transferred fully to a third party, the stress test would model the instrument by creating significant losses in both the up-rate and down-rate scenarios. In the up-rate scenario, the stress test would apply an exchange rate that increases the value of the foreign currency against the dollar by the same percentage that interest rates increase. In the down-rate scenario, the stress test would decrease the exchange rate of the dollar proportionately with the decline in the 10-year CMT, creating a decrease in the value of the dollar similar to that in the up-rate scenario.

[149] A foreign currency swap is ''in the money'' when net funds are due to the Enterprise under the contract and ''out of the money'' when the Enterprise owes net funds under the contract.

[150] 64 FR 18158 n. 168, April 13, 2000.